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AIR ENGINEERING

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DECEMBER, 1961
VOL. 3, NO. 12

AIR QUALITY CONTROL . . . FOR COMFORT, PROCESS AND PROFIT

- From Mine To Product . . . Cloth Collector Applications p. 26
- How To Heat Glass Window Walls p. 30
- Ventilation Design For Coin Operated Dry Cleaners p. 34
- 1st Annual Directory Of Industrial Gas Cleaning Equipment p. 42

HOW FIBERGLAS FABRIC FILTER

Part of the battery of 792 Fiberglas filter bags used by Bethlehem Steel in its Seattle plant expansion project.

1. **BETHLEHEM STEEL COMPANY, WEST SEATTLE, WASHINGTON.** At Bethlehem Steel, they installed two new electric-arc furnaces using Fiberglas filter bags to clean hot dust fumes from the air. The results were so effective that the company received the acclaim of community leaders, while enjoying significant operating economies in the plant.

Letters

"Clean Room For Klystrons"

Editor:

The recent publication of the article on our "Clean Room for Klystrons" (AIR ENGINEERING, April, page 20) has aroused a tremendous amount of interest from many parts of the country, and we have been beleaguered with requests for further information and visits. We have attempted to help whenever possible, and where we did not have the answers, suggested that they get in touch with your organization. However, with regards to visits, I would be grateful if you would publish a small paragraph to the effect that the room is in a classified area and therefore a "need to know" and a clearance are essential and unless these are obtainable it is useless to apply. This is not too formidable, and we have had people from four universities and more than fifteen companies visit us in the last month.

G. V. Freeman
Plant engineer
Litton Industries
San Carlos, Calif.

Industrial Heat And Its Control

Editor:

I have been reading your "Industrial Heat and Its Control," in AIR ENGINEERING, with interest and profit. We are beginning to use the HSI Index in some of our problems. I have attempted to work out the radiant heat contribution in one case, using your article in the August Issue of AIR ENGINEERING, but have run into difficulties.

It seems to me that the equation given for mean radiant temperature, t_w, is really the equation for *absolute* mean radiant temperature T_w. On this assumption, I arrive at a value for t_w of 166, instead of the 161 you show in your example.

I am looking forward to your third article in this series. Will it include a bibliography?

Chlor-Alkali Division
FMC Corporation
C. W. Mudd
Drafting Supervisor

Answer To Mr. Mudd:

I have received your letter pertaining to the industrial heat article in AIR ENGINEERING.

You are correct in noting that the mean radiant temperature equation is for absolute temperature and should have been designated by T_w as was our intention to designate all absolute temperatures with capital letters.

Space for Part II did not permit the inclusion of a series of step charts for determining mean radiant temperature directly. The figures used in Part II were determined by using the Haines and Hatch step charts. For all practical purposes these charts are in close enough agreement with the equation.

I appreciate your bringing the discrepancies in the mean radiant temperature calculation to light.

The last article in this series does include a bibliography.

Robert C. Lemke

Wants Shelter Data

Editor:

Because all of our field men (except our service manager) are engineering graduates and because our products are quality engineered items that must be sold on a specification basis, we are ever on the alert for new techniques, products, etc., that will enable us to perform a needed and worthwhile service to our customer.

Your magazine serves as a very important source of this type of information. Keep up the good work.

With the attention focused on fallout shelters (home and industrial) and the really sorry state of information relating to their adequate *ventilation,* would not an article on this serve an excellent purpose?

Wales & Ward

in laying out your client's plant

ARE YOU GUARDING AGAINST DUST DAMAGE TO MACHINES?

Will there be dust-producing machines in your client's new plant? Such as metalworking, wood-working or penumatic conveying equipment? If so, you should plan now for dust control.

Because dust clogs and gums up costly machinery, lowers production efficiency, causes breakdowns and higher maintenance costs. In addition, dust is harmful to the health of employees.

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Cyclone model. *Also available in portable cabinet models.*

[For more information circle #29 on page 55 reply cards]

dust

remove or collect it best with BUELL

Whether you want to recover valuable chemicals...classify dry pulverized materials...or banish a dust or fume problem—there's a Buell system to give you an extra bonus of efficiency and economy. And—because Buell makes every kind of dust collection—gas cleaning equipment—you're sure of realistic, honest recommendations from your Buell representative or sales engineer.

Everything for dust control or collection: van Tongeren **CYCLONES** with top efficiency ■ **"SF" ELECTRIC PRECIPITATORS** with "Spiralectrodes" for superior performance ■ **TU-BUELL-AR COLLECTORS** for top collection efficiency per dollar ■ **"LR" COLLECTORS** for low-draft-loss fly ash collection ■ **NORBLO**

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[For more information circle #13 on page 55 reply cards]

AIR ENGINEERING

VOL. 3, NO. 12

DECEMBER, 1961

AIR QUALITY CONTROL . . . FOR COMFORT, PROCESS, PROFIT

FEATURES

- **Process Air Control In An Airship Factory** 24
  by A. E. Swindler, plant engineer, Goodyear Aircraft Corp. Problems of heat, humidity and dust that affect bonded joints of dirigible fabric are met in Goodyear plant located near Phoenix, Ariz.
- **All About Cloth Filter Collectors For The Steel Industry** 26
  by R. T. Pring, Dracco Div., Fuller Co. Applications of baghouses to the steel industry, from mine to finished product.
- **How To Heat Large Glass Areas** 30
  by J. B. Olivieri, consulting engineer. Trend is to more glass in modern buildings, which pose downdraft and bodily radiant loss problems. Author describes test set-up, conclusion on best way to prevent discomfort when sitting near glass walls.
- **Why Filter Ventilation Air?** 32
  by engineers of the Air Filter Institute, who demonstrate that ventilation and make-up air filtration can pay for itself in reduced housekeeping, freedom from product contamination, employee health.
- **Ventilation Design For Coin Operated Dry Cleaning Stores** 34
  by consulting editor George Hama. If you do the mechanical layout or install do-it-yourself dry cleaning equipment, you will find this authoritative article of great value.
- **Metered Comfort Saves $5.00 Per Month Per Apartment** 37
  Central gas metering system increases building revenue for apartment house owner.
- **1st Directory Of Industrial Gas Cleaning Equipment** 42
  Over 240 suppliers of all types of dust collectors, filters, instruments, incinerators, stacks and chimneys, solvent recovery systems and a host of other related products.

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COVER

Some two years ago we borrowed one of the covers of THE REPORTER magazine for our own. It so aptly portrays the scope of AIR ENGINEERING in industrial gas cleaning, ventilation, industrial air conditioning, that we take pleasure in using the cover to introduce our 1st Annual Industrial Gas Cleaning Directory (p. 42).

AIR ENGINEERING is published monthly by Business News Publishing Company, at 450 West Fort Street, Detroit 26, Michigan. Subscription prices: United States, Canada: $3.00—1 year; $4.50—2 years; $6.00—3 years. Foreign: $5.00—1 year; $8.50—2 years; $12.00—3 years. Single copies 50 cents. Second-class postage paid at Detroit, Michigan. First issue April, 1959. • CHANGE OF ADDRESS. Notify AIR ENGINEERING and your local Post Office of both your old and new addresses including postal zone numbers by 12th of preceding month.

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NEWS

Union Bucks Use of Epoxies

Seattle—Because some 75% of workmen in contact with epoxy resin suffer headaches, swelling around the eyes and other physical symptoms about three days after handling epoxy resin or breathing its fumes, the Seattle Building & Construction Trades Council has stated that its 20,000 members will not work with these resins without adequate safeguards.

Safeguards include local ventilation and respirators with a separate oxygen or air supply.

Locally the resins are used as a bonding agent for concrete, steel and other materials, on building projects including the new city hall, Ideal Cement Co. silos and the Wanapum Dam.

SCHMIEG INDUSTRIES, INC.

Pioneers in the field of dust and fume collectors for over a quarter of a century.

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Centri-Merge Swirl Type Utility Unit

Relatively compact in size, and adapts itself to applications for exhausting dust or fumes from isolated grinding or buffing jacks, or from other sources where a present larger system may be too distant for practical use. This unit is self-contained and is furnished complete with fan, motor, and drive. Sizes from 400 C.F.M. up to 2,500 C.F.M.

[For more information circle #14 on page 55 reply cards]

Air Pollution And Health

Asthma—According to Dr. Richard A. Prindle, Deputy Chief, Division of Air Pollution, U.S. Public Health Service, "In Nashville (Tenn.), the incidence of acute asthmatic attacks among susceptible patients observed during our two-year study in that city, correlates directly with the observed temporal variations in total sulfate air pollution, as measured by lead peroxide candles."

Cardiac and respiratory disease—Deaths from respiratory and cardiac causes increase as ozone concentration in the air is increased, according to a recent survey.

Chronic Bronchitis—Air pollutants play an important role in development of chronic bronchitis, according to Andrew L. Banyai, M.D., clinical professor of medicine, emeritus, a Marquette University School of Medicine. Dr. Banyai also said that chronic bronchitis constitutes a "definite predisposition" to lung cancer.

New British Dust Standard

London, England—A new British standard on methods of measuring grit and dust emission from chimneys, furnaces, ovens and other sources has been published. Known as B.S. 3405, it is available from the British Standards Institution, 2 Park St., London, W.1.

Also in Great Britain, a national survey has revealed that air pollution is costing that country over $700 million dollars annually.

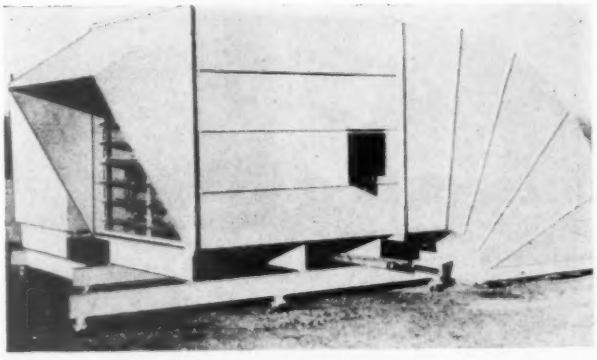
Yet another report states that Great Britain is becoming cleaner . . . that in seven years smoke output dropped from 2.3 million tons annually to 1.9 million tons. Results were obtained by so-called "smokeless zones" in which no smoke-producing fuel could be used.

(Please turn to page 15)

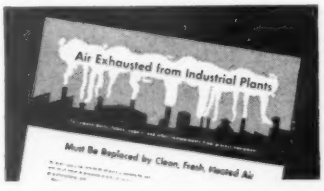
To receive information on any of the New Products, circle the item reference number on the postage-free reply cards on page 55, Communications Center.

for paint spray booths
or other areas
under exhaust . . .

MAKE-UP AIR HEATERS
with
AIRFLO® BURNERS ASSURE
CLEAN FRESH AIR

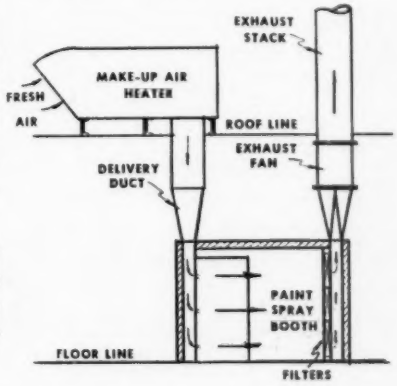


Aerovent Fan Company unit with MAXON AIRFLO Burner System for supplying make-up air to paint spray booth.



Write today for a copy of Bulletin AS-62, or see your MAXON Application Engineer for solutions to your make-up air problems.

Directly compensating make-up air heating systems (below) deliver heated air into the immediate vicinity of the equipment or process being exhausted with the sole purpose of replacement of the air removed at that point.



MAXON

MAXON PREMIX BURNER COMPANY
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[For more information circle #15 on page 55 reply cards]

DUST PARTICLES ARE SCHIZOPHRENIC

Industrial dusts have split personalities. They can be peace loving, pleasant, and in some cases precious . . . in the proper environment. But let them get out into the open air where they are free to roam and settle where they please! They become unbearable public enemies . . . atmospheric delinquents. Take fine mineral particles, for instance. In their proper setting their brilliance and striking colors would stir the heart of a poet. But who would want them settling from the sky on a white suit or staining a newly painted house? Esthetic beauty in one place can be unwanted ugliness in another.

Let Ducon dust specialists psychoanalyze your industrial dust and prescribe the right treatment to keep it under control. We have a full line of wet and dry dust control devices to solve your problem.

Write for Bulletin C 1058

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THE Ducon COMPANY INC.

147 EAST SECOND STREET • MINEOLA, L. I., NEW YORK

CYCLONES • CENTRIFUGAL WASH COLLECTORS • TUBULAR CLOTH FILTERS • DUST VALVES

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[For more information circle #16 on page 55 reply cards]

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EDITORIAL:

Air Pollution Needs Megatons More Attention!

RADIOACTIVE FALLOUT from nuclear explosions gets megatons more publicity in the daily press and arouses the indignation of millions more citizens than air pollution per se.

Yet air pollution, according to most authorities, is a far greater threat to health than the present level of radioactive fallout.

To judge by the pall of polluted air that extends nearly unbroken from Pittsburgh to Detroit and from Boston to Washington, D. C., covering nearly half the nation's population, the country has not yet begun to fight this aerial blight.

Certainly, for the most part, the means for ending air pollution are already here, even though the boards of directors of the companies that do the pollution haven't seen fit to allocate funds for these means.

In a way, industry can't alone be blamed for not cleaning up its own emissions for at least two reasons, the first and most important of which is public apathy about air pollution and the second of which is that gas cleaning equipment cost is generally pure overhead. People get excited about genetic damage to future generations due to radioactive fallout, and forget about the fallout from smokestacks which will shorten their lives by far more years, collectively, than any amount of radioactive fallout we're likely to get, short of war.

We can't induce the general public to stop burning leaves in the Fall, let alone properly burn garbage where municipal facilities are not provided, or share the ride to cut down automotive exhaust emissions. No amount of warning, no explanation as to the cancer causing effects of smoke from burning leaves, seems to deter the great American public from their annual ritual of raking up and burning their leaves in one vast collective, lung damaging pile.

It's only natural, we suppose, to find installations of air pollution control equipment concentrated in those few cities whose citizens, finally aroused by

(Please turn to following page)

Editorial

(Continued from preceding page)

streaming eyes, soiled newly washed laundry, respiratory distress, increasing house cleaning chores and malodorous fumes, have forced passage of stringent air pollution control laws.

Most of the citizens, in the rest of the country including the majority of the medical profession, who should know better, seem not to care.

Industry then will only spend money for air pollution control equipment for at least one of three reasons. First, a well informed management who realizes that it is only a matter of time until public opinion forces the issue, installs air cleaning equipment on a new process, at a time when it costs less to install than after a building is built or production facilities put in. Second, gas cleaning equipment is installed when pollutions find their way back into the plant and so harm the product, as in the case of a paint spray booth. Third, and least frequently, in those isolated cases where product recovery pays for the gas cleaning equipment, funds are readily allocated for its installation.

Because the day will inevitably come when pollution becomes so bad that the public demands action, we conclude that intelligent management in any plant would be wise to install air pollution control equipment in any new construction, the time when it is least costly to buy and install.

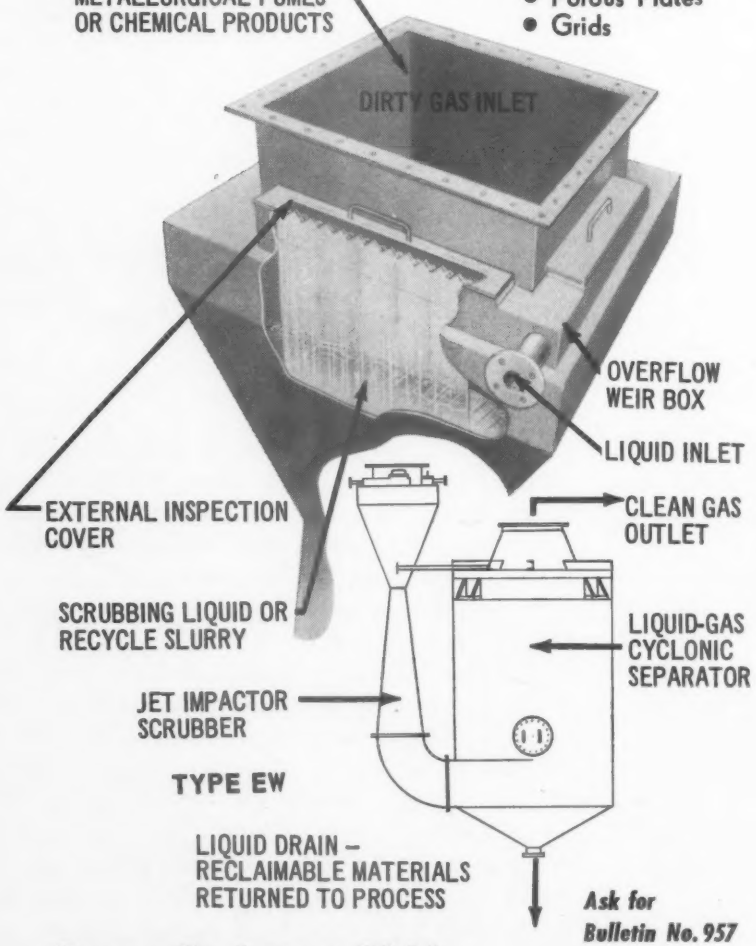
We will inevitably have to become as concerned about fallout from industrial and private activity as we are about fallout from peacetime nuclear explosions, for our air is becoming increasingly polluted on what seems to us to be on the same geometric scale as the population explosion. ▲▲

Eugene A. Sloane, Editor

AIR POLLUTION CONTROL SYSTEMS

Recover Valuables While Abating a Nuisance Problem

Non-Plugging Features *Has No:*
- Baffles
- Porous Plates
- Grids



Ask for Bulletin No. 957

Process Equipment Division
AUTOMOTIVE RUBBER CO., INC.
12550 Beech Road - Detroit 39, Michigan Phone KE 2-3000

[For more information circle #17 on page 55 reply cards]

Meetings

American Institute of Consulting Engineers, Annual Meeting, *Engineer's Club, New York City, Jan. 15, 1962.*

1962 Plant Engineering and Maintenance Show And Conference, *Convention Hall, Philadelphia, Pa., Jan. 22-25.*

Training Course in Microscopic Analysis of Atmospheric Particulates, *Robert A. Taft Sanitary Engineering Center, Cincinnati, Ohio, Jan. 22-Feb. 2.*

American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., *Chase-Park Plaza Hotel, St. Louis, Mo., Jan. 28-31, 1962.*

Air-Conditioning and Refrigeration Wholesalers, *Los Angeles, Calif., Feb. 9-11, 1962.*

12th Exposition of the Air-Conditioning, Heating and Refrigeration Industry, *Great Western Exhibit Center, Los Angeles, Feb. 12-15.*

4th Annual Industrial Ventilation Conference at *North Carolina State College, Raleigh, N. C., March 19-22.*

National Association of Corrosion Engineers, Annual Conference and Corrosion Show, *Municipal Auditorium, Kansas City, Mo., March 19-23.*

American Power Conference, *Sherman Hotel, Chicago, Ill., March 27-29, 1962.*

American Industrial Hygiene Conference, *Sheraton-Park Hotel, Washington, D. C., May 13-17.*

NEWS of the Industry . . .

(Continued from page 8)

RECIRCULATION OF OPERATING ROOM AIR IS DEEMED SAFE

Chicago—Recirculation of air in hospital operating rooms is safe, three St. Louis researchers said last month, adding that lifting of the general rule against it would save hospitals thousands of dollars.

Recirculation of air in operating rooms has been generally prohibited because of the possible dangers of bacterial contamination. But the researchers found in a recent study at Barnes Hospital that recirculated air is just as safe as fresh outside air, and considerably less expensive to provide.

Writing in the November 1 issue of HOSPITALS, Journal of the American Hospital Association, they said:

"At Barnes Hospital, during a four-month test, bacterial air contamination was as well controlled in an operating room in which 80 per cent of the air was recirculated through an inexpensive dry filter as it was in a second operating room in which the air was provided after filtration through a large electrostatic filter and discarded after one passage."

Samples of air from the two rooms and the outside were analyzed daily.

Cost analysis of the two methods indicated that recirculating air would save thousands of dollars. Initially $42,000 would be saved on the purchase of less expensive equipment for Barnes Hospital's 14 operating rooms. Additionally there would be an annual saving of $3,500 in operational expense, the authors said.

They noted that many states prohibit recirculation of air in an attempt to prevent the spread of airborne bacteria. The Hospital Survey and Construction Act of 1946 (Hill-Burton Act), under which federal funds are available for hospital construction, requires that hospitals provide an all-outside air supply.

"Blind acceptance of these decrees results in great expenditures of public funds for the purchase of complicated air handling devices on a purely theoretical basis," the authors said, explaining that it had not been proved that an all-outside air supply was actually safer than a recirculated supply.

The authors are Harry R. Bernard, M.D., associate professor of surgery, Washington University School of Medicine; William R. Cole, M.D., D.Sc., instructor in surgery at the University, and James C. Claywell, assistant chief engineer, Barnes Hospital, and lecturer in engineering maintenance, Washington University. Both physicians are associated with Barnes Hospital.

STATE OF THE AIR OVER EIGHT MAJOR U. S. CITIES CONTINUOUSLY MONITORED

Washington, D. C. — Establishment of a continuous air-monitoring program to provide vital information on air-pollution levels in American cities was announced recently by Surgeon General Luther L. Terry of the Public Health Service.

Designed to provide automatic measurement and analysis of the continuously fluctuating levels of pollutants in urban air, the program is based on special air-monitoring equipment located in the center-city area of eight major U.S. communities—Chicago, Ill., Cincinnati, Ohio, Detroit, Mich., Los Angeles, New Orleans, Philadelphia, San Francisco, and Washington, D. C.

Built and equipped by the Public Health Service at a total cost of $300,000, the new equipment will provide, at the outset, automatic and continuous sampling and analysis of seven gaseous pollutants—sulfur dioxide, nitric oxide, nitrogen dioxide, carbon monoxide, ozone, total hydrocarbons, and total oxidants.

In addition to automatic gas sampler-analyzers, the stations will also house supplementary equipment to provide information on particulate pollutant concentrations, pollutants washed out of the atmosphere by rainfall, and measurements of wind turbulence at the sampling sites.

(Please turn to following page)

Cincinnati gets air monitoring set-up. Left to right: J. Reed Hoffman, Chairman, Cleaner Air Week; J. Marc Trabert, Councilman; Mayor Walton Backrach and Arthur C. Stern, Chief, Robert A. Taft Sanitary Engineering Laboratory.

NEWS of the Industry...

(Continued from preceding page)

DEPARTMENT OF DEFENSE OUTLINES NEW SHELTER PLANS

Fallout shelter plans signed by architects and consulting engineers which have previously been submitted to the now defunct Office of Civil Defense Management in Battle Creek, Michigan, should now be re-submitted for checking to its successor organization, the Department of Defense.

According to a talk given by Paul Visher, Director, Technical Operations, Department of Defense, Washington 25, D. C., at a meeting of the National Shelter Association, held last month in Chicago, best way to expedite DOD check on any shelter plan or product would be to submit signed shelter plans or product sample to Mr. Visher's department directly, regardless of any prior acceptance that may have been made by the OCDM.

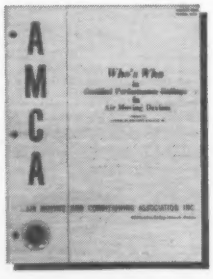
Mr. Visher also outlined his department's plans for fallout shelter research and development, which are summarized below:

1. **Filters** — DOD has granted $40,000 to the Army Chemical Corps for research on a filter package for fallout shelters. There is wide disagreement on the subject of filters, according to Visher, who feels that a super-interception type filter would be needed where shelter air is blower supplied. He reported that the National Academy of Science is also investigating the shelter air filter problem, and that this organization will come up with conclusions in the near future.
2. According to a report based on a survey by the American Telephone and Telegraph Company, 80% of the cost of remaking otherwise suitable areas into fallout shelters in existing buildings would go for mechanical equipment such as air filter systems, blowers, etc.
3. The DOD has earmarked $15-million dollars for shelter research. A National Shelter Center is to be built on a 10 to 15 acre tract in Washington, D.C. for research and test of shelter products and designs.
4. While 10 sq. ft. per person has been thought of as the minimum in shelter design, research will be done on spaces as small as 2 sq. ft. per person, to check on emergency systems, in the light of recorded incidents in which human survival has been made under these extremely crowded conditions.
5. The DOD is placing major shelter research emphasis on protection against fallout only, this being deemed the most immediate necessity.

Who's Who in Certified Ratings?

The first edition of "Who's Who in Certified Performance Ratings" is now available to users and specifiers of air moving equipment. This new publication of the Air Moving and Conditioning Association meets the recognized need for an official directory of manufacturers and products licensed by AMCA to use the Certified Ratings Seal.

The 54-page directory contains essential product identification data on all air moving devices which have been tested and rated for performance in accordance with the rigid requirements of the AMCA Certified Ratings Program. Revised issues will be published periodically.



Copies of Bulletin 261A, "Who's Who in Certified Performance Ratings" are available from: Air Moving and Conditioning Association, Inc., 2159 Guardian Building, Detroit 26, Michigan.

[For more information circle #18 on page 55 reply cards]

Later research will include means of artificially supplying oxygen and other means for protection against atmospheric oxygen depletion due to firestorms; blast protection and neutron bomb protection.

6. Army Chemical Corps has developed a pill which will give humans a fallout radiation protection by a factor of about 5. However, pill has some side effects that are being worked on, and the pill is slated for use by troops in the field.
7. No tax relief for industry shelters will be asked for by the DOD, on the basis that the corporate tax structure has such relief built into it.
8. DOD will list sources of fallout shelter supplies and equipment, as soon as this material can be checked out by their technical staff. DOD is testing and rating equipment now.
9. DOD is to publish a technical manual for engineers and architects on bomb shelter design. Manual to be ready by December, 1961.
10. Shelters will be incorporated into new Federal buildings started in 1962. $10-million has been allocated for shelters in Federal buildings built since 1959.
11. A national warning network will utilize existing public utility electrical distribution lines. An alarm that can be installed in every home or business buildings will be sold by the utility and its cost tacked onto the monthly electrical bill.

How Much Dust Falls on Earth?

About 10,000 tons of dust falls on earth every day, according to a report by Drs. C. W. McCracken, W. M. Alexander and M. Dubin of the National Aeronautics and Space Administration.

This dust fallout was based on measurements of inter-planetary dust by U.S. and Russian rocket probes.

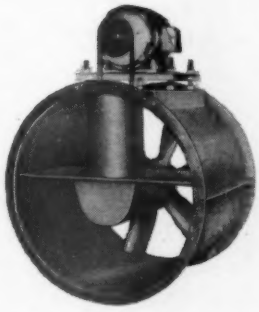
(Please turn to following page)

DON'T
STEW
OVER
FUME
REMOVAL

Hartzell All-Fiberglass Duct Fans offer unsurpassed resistance to corrosion...

at a cost far below that of stainless steel or monel units

Hartzell fiberglass duct fans have lasted for years in installations where the fans previously used has required replacement after only a few months of service. Yet, despite this exceptional resistance to acids, alkalies and other corrosive elements, the cost of Hartzell fiberglass units is much closer to that of duct fans of conventional construction than it is to that of stainless steel or monel units which are often prohibitively expensive. Seven sizes, 12" to 44". Fiberglass stack cap also available.



For complete details, just give your nearby Hartzell field engineer a call. You'll find him listed in the Yellow Pages or in the Hartzell catalog in Sweet's Plant Engineering and Industrial Construction Files.

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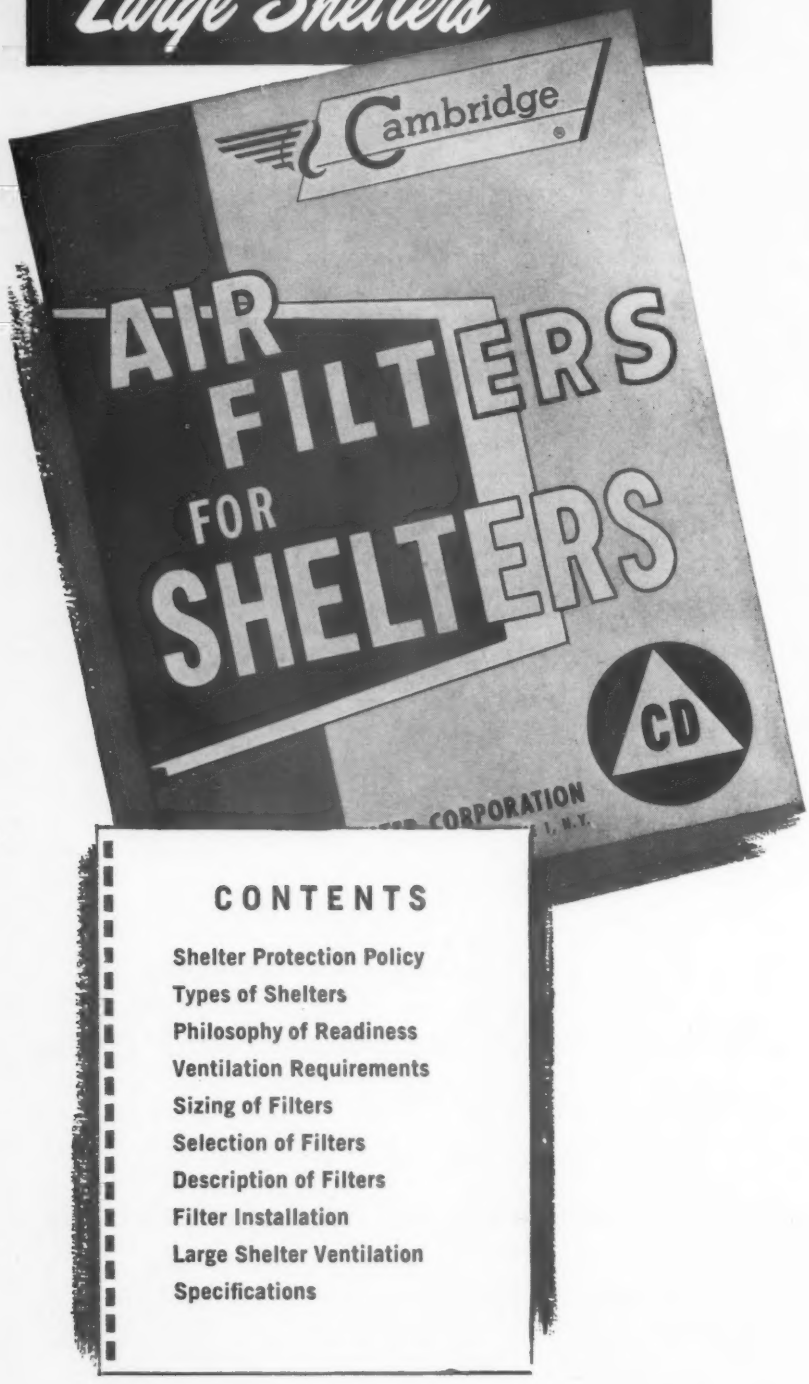
[For more information circle #19 on page 55 reply cards]

This Book Will Help You Design
Large Shelters



CONTENTS

- Shelter Protection Policy
- Types of Shelters
- Philosophy of Readiness
- Ventilation Requirements
- Sizing of Filters
- Selection of Filters
- Description of Filters
- Filter Installation
- Large Shelter Ventilation
- Specifications

This booklet outlines present OCDM recommendations and indicates types of equipment available to meet future requirements necessitated by changing weapons capabilities. It has been prepared by the makers of the world-famous ABSOLUTE filter – pioneers in the development of A.E.C. filters.

If you are responsible for the design of large shelters, write for a copy.

Cambridge Filter Corporation
744 East Erie Boulevard, Syracuse 1, N.Y.

NEWS

(Continued from preceding page)

AIR POLLUTION at the enforcement level

San Francisco—Daniel J. Callaghan Jr. has been named Chief Administration Officer of the Bay Area Air Pollution Control District. Mr. Callaghan was Director Of Industrial Development for the San Francisco Bay Area Council.

He will take over most of the District's administrative program. Callaghan will handle public relations "after consulting with Linsky." While Linsky makes $18,372, to Callaghan's $15,500, Callaghan will control spending of the budget and prepare the annual report.

Mr. Callaghan also has served as an assistant vice president for the Crocker-Anglo National Bank, and as assistant to the San Francisco division manager of the Pacific Gas And Electric Co.

East St. Louis, Ill.—City Council has set up a five-man commission to study smoke control ordinances in St. Louis after which the city "will adopt our own ordinance" according to Mayor Alvin G. Fields.

Birmingham, Ala.—A Congressional hearing on air pollution in this area is becoming a possibility, said Dr. J. Garber Galbraith, Birmingham Chamber of Commerce director.

The area has a mountain topography with weak air drainage and with rare temperature inversion. This is reported ideal for the collection of air pollutants since there are no variable winds except in the latter part of the Summer and Fall.

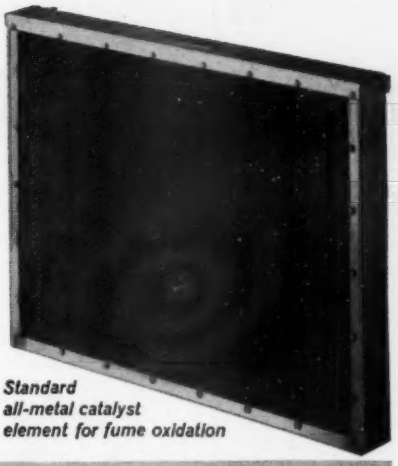
It also was pointed out in a report by Dr. Donald Sweeney, chairman of the County Board of Health, that there has been a rapid increase in coal, fuel oil, gasoline and diesel oil consumption which makes it "inevitable" that further atmospheric pollution is going to occur.

"The Board of Health does not

(Please turn to page 20)

Catalytic Systems

FOR ■ FUME OXIDATION
■ POWER AND HEAT RECOVERY
■ PROCESS GAS PURIFICATION



Standard all-metal catalyst element for fume oxidation

Economical conversion of hydrocarbon or organic gases and vapors to harmless carbon dioxide and water vapor and useful heat energy is being successfully accomplished by low-temperature, flameless, catalytic oxidation. Catalytic Combustion pioneered the development of catalytic oxidation systems for complete one-step disposal of objectionable gaseous and vapor emissions.

COMPLETELY ELIMINATE KETTLE COOKING FUMES

Whatever the kettle operation—paints, oils, greases, deep fat frying, rendering, etc.—Catalytic Combustion systems completely eliminate noxious effluents from one or many kettles. Fume and condensation elimination improves safety and reduces maintenance.

POWER AND HEAT RECOVERY THROUGH WASTE-GAS OXIDATION

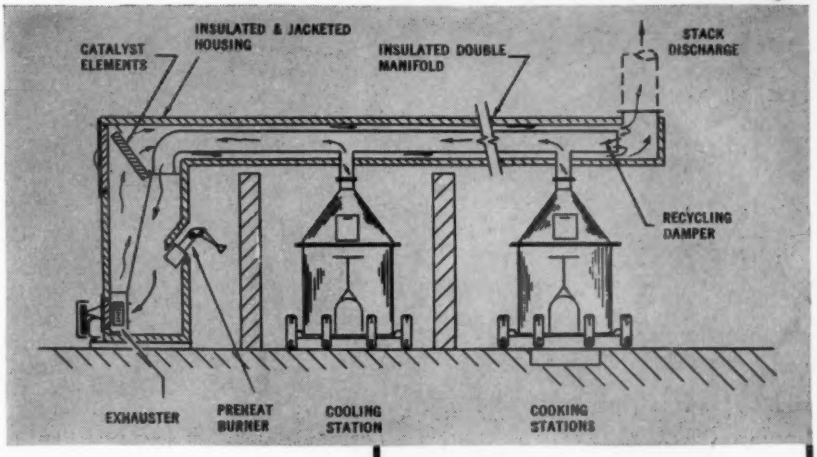
Tail gases from high pressure processes (such as ethylene oxide and nitric acid production) can be profitably utilized. Here noxious contaminants are oxidized by a catalytic pressure reactor and directed to a gas turbine for power recovery. Through Catalytic oxidation, waste-gases are often converted to valuable heat energy for recovery to process equipment, plant make-up air or for steam generation and superheating.

IDEAL GAS PURIFICATION THROUGH CATALYSIS

Catalytic Combustion systems provide a highly efficient method of gas purification . . . oxygen removal from hydrogen, carbon dioxide, nitrogen, argon, helium and other inert gases . . . hydrogen removal . . . nitrogen oxides reduction . . . hydrocarbon and combustible removal. Catalytic's patented all-metal catalyst media assures a high degree of impurity removal. Catalyst is available in cartridge or bed form, or complete with reactor vessel.

PROVEN RECORD OF CHEMICAL FUME OXIDATION

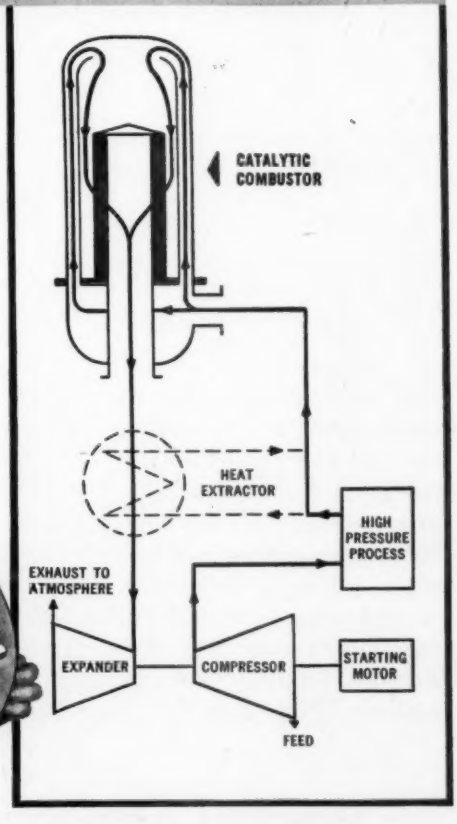
For over a decade the Catalytic Combustion process has been extensively employed by the chemical industry for efficient air correction. Exhaust fumes released in the production of phthalic and maleic anhydride, formaldehyde, phenols, synthetic fibres, resins, nitric acid, and many other processes are effectively and completely oxidized by means of Catalytic Combustion systems. Catalytic Combustion's rugged all-metal catalyst element is lightweight, unbreakable and resistant to thermal shock. Catalytic elements are built to standard and special shapes and sizes and complete systems are custom-engineered to assure maximum effectiveness.



ABOVE: Catalytic fume combustion system for multiple station kettle cooking operation.

RIGHT: Catalytic Tail Gas Power Recovery System.

BELOW: All-metal gas purification catalyst cartridge ready for insertion in reactor vessel.



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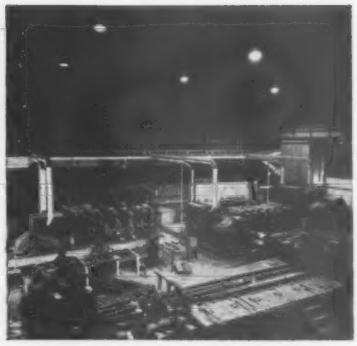
[For more information circle #20 on page 55 reply cards]

Wheelabrator ultrafiltration provides air cleaner than you breathe



In this mill room, a Wheelabrator Ultra-Filtration® unit has eliminated the cost of 24 man-hours of maintenance labor a week in upkeep of 3 roughing mill drive motors.

A demonstration of WHEELABRATOR'S

VITAL VALUES

Air that's pure—really pure—is vital to the operation of steel mill drive motors. And ultimate purity of the filtered air is one of the Vital Values you get with Wheelabrator Air Filters. At a prominent steel mill, installation of Wheelabrator Ultra-Filtration to provide clean air to three drive motors totaling 2,200 h.p. has virtually eliminated weekly motor maintenance attention, saving $3,120.00 in direct labor cost alone per year. Added to this saving, mill room down time costing $6,000.00 annually due to motor trouble has been avoided. Wheelabrator Ultra-Filtration provides the air purity required, at a cost far lower than many systems offering less efficiency. Get the whole story of these vital savings. Write today for information.

VITAL VALUES FOR INDUSTRY

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AIR FILTRATION

WHEELABRATOR CORPORATION, 498 S. Byrkit St., Mishawaka, Ind.
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[For more information circle #21 on page 55 reply cards]

NEWS

(Continued from page 18)

wish to impose unreasonable restrictions," said Dr. Sweeney, "but feel that something should be done and we do not want it to come from Federal government interference."

Instant Burley With Engineered Air Drying

The process of curing tobacco to burley may soon be done in days instead of weeks, if experiments conducted by a tobacco grower and the University of Kentucky prove out as expected. A new way of tobacco curing is greatly needed, according to grower J. D. Gay of Winchester, Ky., who has been experimenting with a $4500 curer in which the tobacco is cured in four or five days under controlled conditions of temperature and humidity. The problem, according to Edward Smith, research assistant at University of Kentucky, is to find right combinations of temperature and humidity. Gay said so far it costs about ¼¢ for oil for heat and about 1/10¢ for electricity, per pound of tobacco in the new curer.

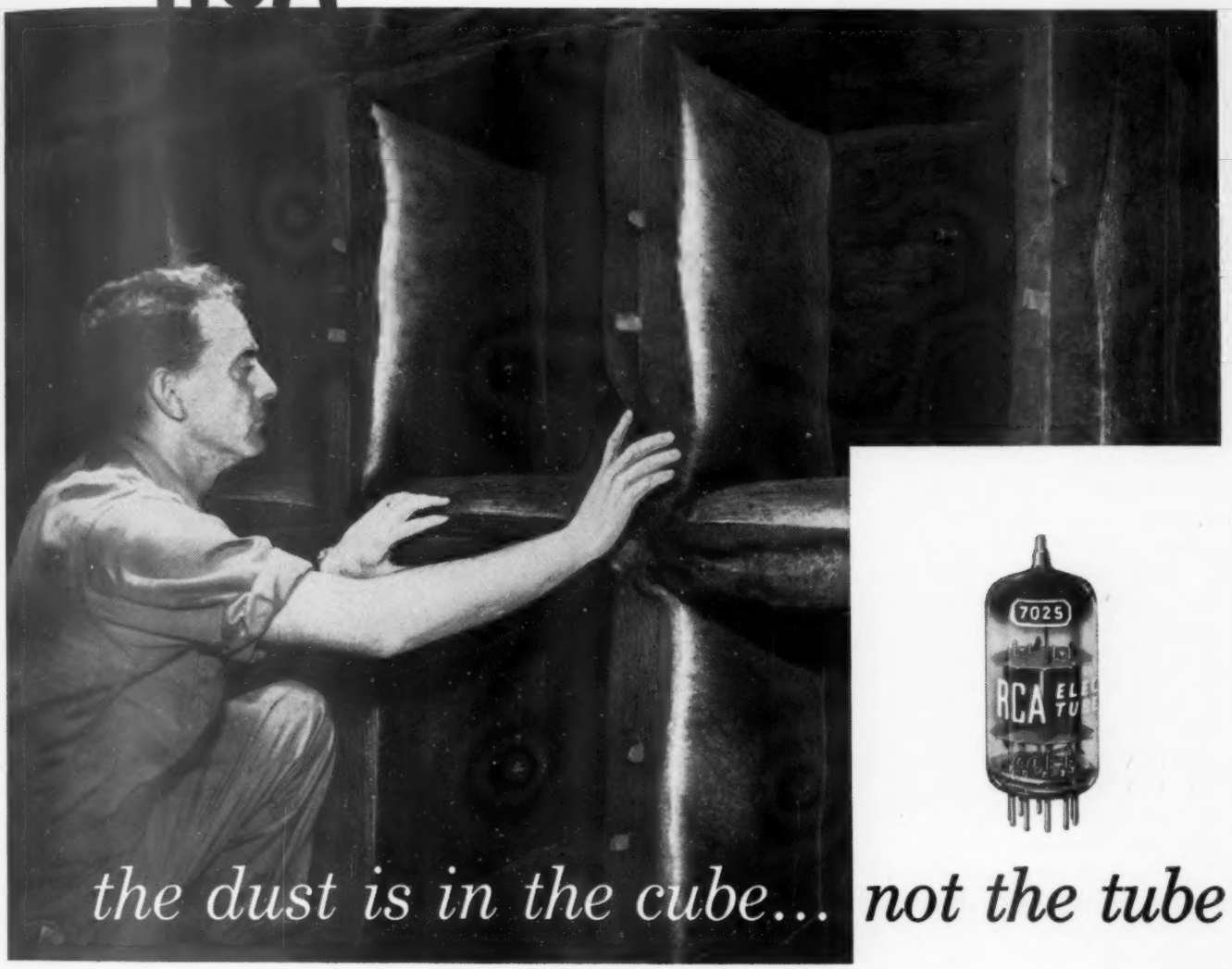
ASHRAE MEETING

New York — The Semiannual Meeting of the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) will be held January 29-February 1, 1962, at the Chase-Park Plaza Hotel, St. Louis, Missouri.

The program for the ASHRAE meeting will feature four technical sessions on Refrigeration, Air Filters, Heating and Heat Transfer, seven symposiums and six forums. Among the 16 papers to be presented at the technical sessions will be those on Operating Principles Of Non-Ionizing Electrostatic Air Filters; Solar Heat Gains Through Plain, Coated, And Laminated Flat Window Glass; and An Instrument For The Measurement Of The Humidity Of Air.

The symposiums will also cover Industrial Ventilation; Domestic Refrigerator Engineering; Steel Boiler Ratings; and Combined Heating And Air Cooling Systems.

at RCA



the dust is in the cube... not the tube

Air clean enough to breathe could contaminate a miniature vacuum tube. For maximum filtering efficiency a pre-filter precedes an electrostatic precipitator at RCA's electron tube plant in Harrison, N. J. Recently, an increased heat load required an increase in the velocity of air—from 600 ft. to 800 ft. per minute—to pass through the pre-filter. This meant changing filters every two weeks. RCA required greater filtering efficiency and longer filter life without a major overhaul of the system, and UNION CARBIDE had the answer!

UNION CARBIDE's new ULOK Cube Filter provides .06 WG resistance (clean) and *four months freedom from maintenance* before the .5 WG resistance requiring a filter change is reached. Furthermore, since this new filter stops particles as small as 3 microns, there is a noticeable reduction of particulate matter on the ionizing wires of the electrostatic precipitator.

ULOK Cube Type Air Filters are delivering similar performance in major installations everywhere. Fashioned of DYNEL modacrylic fiber—a dry unoiled medium which may be vacuum cleaned—these unique filters are unexcelled for stopping and holding unusually large quantities of dust, dirt, and foreign matter. In addition, their exclusive open-box shape provides far greater filtering area than conventional filters with the same face dimensions, permitting use in high-velocity applications with the efficiency of low-velocity operation. And . . . they last *6 to 12 times longer* than other types of air filters.

Available in a wide range of sizes and shapes—cubes, panels, rolls, and pads—ULOK Air Filters are suitable for both new and modified systems. For detailed information on the complete line of ULOK Air Filters, including efficiency and pressure-drop charts, write:

UNION CARBIDE

UNION CARBIDE DEVELOPMENT COMPANY
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Dept. E, 270 Park Avenue, New York 17, New York

UNION CARBIDE, ULOK, and DYNEL are registered trade marks of Union Carbide Corporation

[For more information circle #22 on page 55 reply cards]

? ? ? ? ? ? *Questions &* ANSWERS ? ? ? ? ? ?

Question

What effect does electrostatic filtration have on air ionization?

L.L.P., N.J.

Answer

Electrostatic precipitators as are used for cleaning air in office, commercial, hospital and school buildings are generally of the low-voltage type, as compared with the high-voltage heavy-duty industrial units for heavy dust loadings.[1] In the low-voltage type the precipitator is divided into separate ionizing or charging and collector zones.

In the ionizing[2] or charging zone a voltage of 9000 to 14000 volts dc imposes a positive electrical charge on all particles passing through the electrical field. The particles then pass on to the collector zone which consists of negatively charged plates which attracts the particles. These plates have a potential between 5000 and 10000 volts dc. Adhesive on the plates is sometimes used to retain the particles.

It is unlikely that any negative ions will survive the high voltage ionizing field which is imposing a positive charge. If the electrostatic precipitator has poor collection efficiency due to the charged dust by-passing or not being retained on collector plates a strong positive charge will develop in the space with an increase in positive ions.[2] However, if a negative ion generator[3] is installed in the effluent air from such an electrostatic precipitator the space charge can be reversed and the number of negative ions will increase.

A precipitator operating at high collecting efficiency will not give difficulty with space charges difficulties. Tests on a combination electrostatic and mechanical filters[3] together with a tritium type radioactive negative ion generating source have shown an increase in negative ions and a decrease in positive ions.

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1. *Air Conditioning and Engineering, 2nd Edition,* American Blower Corp., p. 165.
2. Penny, G. W. and Hewitt, G. W., Electrical Charged Dust in Rooms. *Electrical Engineering,* November, 1949, Vol. 68, No. 11, p. 943.
3. Beckett, John C. Some Application of Air Ion Measurement. *Conference Paper,* September 12, 1957, New York, N. Y., American Institute of Electrical Engineers.

Question

What can be done toward prevention of wall smudging, referring to discoloration which occurs on the walls above electrical heating devices?

H.B., N.J.

Answer

The principles connected with the cause of wall smudging are the same whether the heating is of electrical type or of other types. The cause (1) of smudging is due to small fractional micron particles depositing on the wall surfaces because of:

1. Diffusion due to Brownian movement of the suspended contaminant particles,
2. Convection which keeps the particles from settling out and carries the dirt particles to the wall surfaces,
3. Thermal precipitation[2][3] caused by a temperature gradient between hot and cold surfaces,
4. Filtration[5] through certain porous wall surfaces, due to pressure differences across the wall from wind velocity,
5. Electrical forces[4] from the velocity of air over some surfaces which produce negatively or positively charged particles, and
6. Moisture[6] either from the walls into the room or from the rooms to the walls driving particles into the walls.

Thermal precipitation[1] which is thought to be a principal cause of smudging and dampness tends to cause objectionable nonuniform smudging pattern which produces lath marks, studding shadows, nail outlines and other structural patterns. This is probably the main cause of smudging marks with electrical heating devices.

Methods of control suggested are air cleaning, uniform heat insulation of walls and sealing of walls if moisture and filtration are the cause. If the dirt can be deposited uniformly a general darkening of the walls will occur, which for the most part is not too objectionable. The striated pattern dirt deposit is highly noticeable and should be minimized.

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(2) Drinker, P. & Hatch, T. *Industrial Dust,* McGraw-Hill Book Co., Inc., 1936.

(3) Aitken, J. Collected Scientific Paper edited by C. G. Knott. Cambridge University Press. London, 1923, p. 84.

(4) Generation of Static Electricity in Blower Systems, by A. H. Nuckolls (Underwriters' Laboratories Bulletin of Research No. 8, April, 1939).

(5) ASHVE Research Report No. 888. Air Leakage Through Various Forms of Building Construction, by F. C. Houghton et al. (ASHVE Trans. Vol. 37—1931, p. 177.)

(6) Hooper, W. H. The Deposition of Dust on Walls. (Physics, Vol. 1, 1931, p. 61.)

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Air Tumbler
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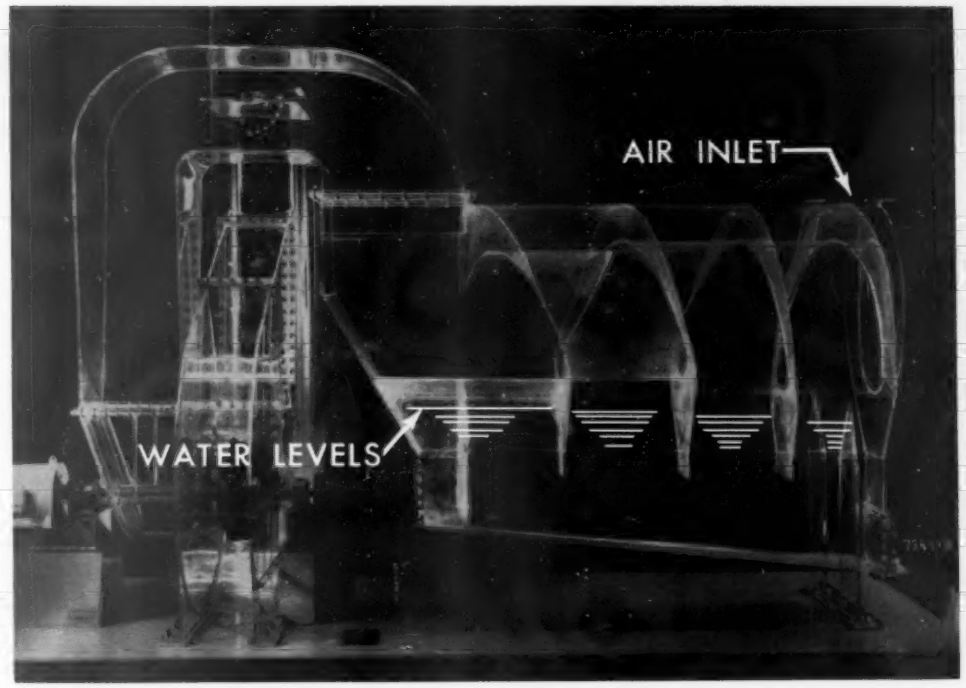
THE MASTER OF DUST IN INDUSTRY



The soundness and simplicity of the unique design of the AIR TUMBLER account for its outstanding performance, which combines exceptionally high efficiency of collection of even sub-micron size dust particles with a moderate pressure loss and a freedom from costly maintenance never realized before.

Other advantages of this wet collector are:

- negligible humidification of the air;
- detachable and interchangeable sludge tanks for Periodical, or Continuous sludge removal either hydraulic or mechanical;
- no water eliminators, no moving parts, no sprays.

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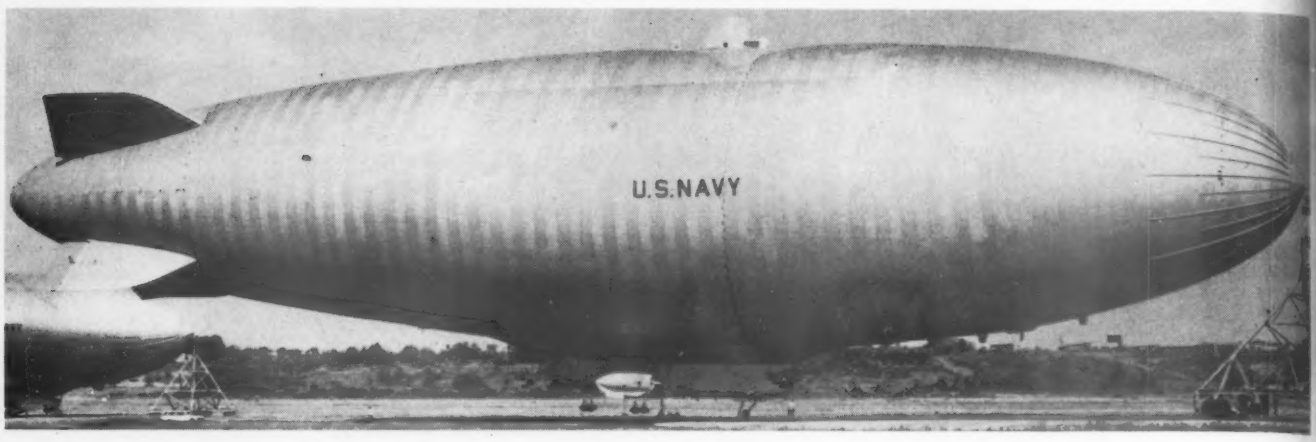

Process Air Control In An Airship Factory

Where products are sensitive to dust, heat, humidity, you'll find author's methods of controlling these factors of value to you.

by A. E. Swindler
Plant Engineer
Goodyear Aircraft Corp.
Phoenix, Arizona

AIRSHIP ENVELOPE MANUFACTURING operation presents a more or less unique dual problem in both cleanliness and humidity.

In 1950 the production of airship envelopes was moved from Akron, Ohio to Phoenix, Arizona, to escape some of the difficulties that humidity conditions were causing. To some, this move may look like jumping out of the frying pan into the fire. This is not true, however, as the move is considered very successful.

In Arizona, dust is a major problem and the humidity is generally very low. Dust storms can blow in and blot out the sun and cut ground visibility to 200-300 ft. In the summer, the humidity may remain at 10 percent or lower for extended periods during the daylight hours and the normal outside temperatures will range up to 115°. The wind velocity at times will reach gusts of 75 mph. Generally, however, the wind is quite mild, with a normal of about 5 mph.

Fabrication of airship envelopes consists of cementing and sewing together 36-in. widths of rubberized fabric into an envelope or bag containing some 1,500,000 cubic feet. Cements used in the operation are vitally important from a strength standpoint. Therefore dust or foreign matter of any kind is not permitted to come in contact with the cement while it is drying or before the two pieces are put together. Also, high humidity affects the strength of the cement and retards the drying, increasing manufacturing costs. Low humidity also is a bug-a-boo because static electricity can generate in the rubberized fabric and ignite the solvents in the cements. Therefore, we are required to control dust to what would be considered a high dust level condition compared to white rooms, and humidity must be controlled between 45-55 percent.

The building housing this operation is a hangar-type, 200 ft x 500 ft. x 60 ft. to the roof deck, or 6,000,000 cu. ft. Overhead type doors are at both ends. A continuous ventilator with louvers that can be opened or closed extends the full length along the center of the roof. The construction is steel frame, wood roof deck with built-up insulated roof, corrugated asbestos siding and Truscon steel window sash comprising ⅓ of the side walls. The doors are 8-section, Republic Steel, vertical lift canopy doors. With this type building, it may appear that we have an insurmountable problem controlling dust and humidity. This, we are happy to relate, is far from the truth, for a very commendable job of air conditioning is being done to make the envelope operation possible here in Arizona.

Dust, humidity and temperature are controlled with the same equipment: twelve 12,000 cfm, 2-speed air wash capillary units, equipped with temperature and humidity controls. The area also is under constant surveillance of maintenance personnel as the

Sealing fabric for airship envelope. Work is done in a pressurized, air conditioned building because the sealed joints are improved when dust, heat and humidity are controlled.

automatic controls are not sensitive enough to keep up with a quick change in weather conditions. A red light is flashed on in the office when the area humidity gets out of limits, also.

The building is kept pressurized at all times. The outside pressurizing air is washed when passing through the capillary units, controlling the dust. Humidity is controlled by increasing or decreasing the amount of water in the capillary units or heating the water. In cases of high humidity conditions, steam is turned into the space heating coils to drive the temperature up, rarely over 85°, and lower the humidity accordingly. This is required during rainy weather only. Also, to control humidity, units are turned to low or high speed or on and off as the need requires, keeping just enough units running and at the right speed to keep the building pressurized.

Humidity Checked

In an area this large, with 12 individually controlled units, it is easy to get part of the area out of control. The automatic controls do a very commendable job however, but they are not 100 percent reliable. Therefore, to maintain 45 to 55 percent humidity, sling psychrometer checks are made periodically throughout the area. Records are kept of these readings. This gives us a check on the automatic controls and enables us to keep the entire area within the very close limits specified.

Analyzing the sludge from the capillary units revealed a variety of foreign materials such as dust and sand particles up to the size of a match head — also, pieces of roofing, wood and weed stems.

On the whole, we have an entirely satisfactory comfort control system that is a vital production tool in our plant. ▲▲

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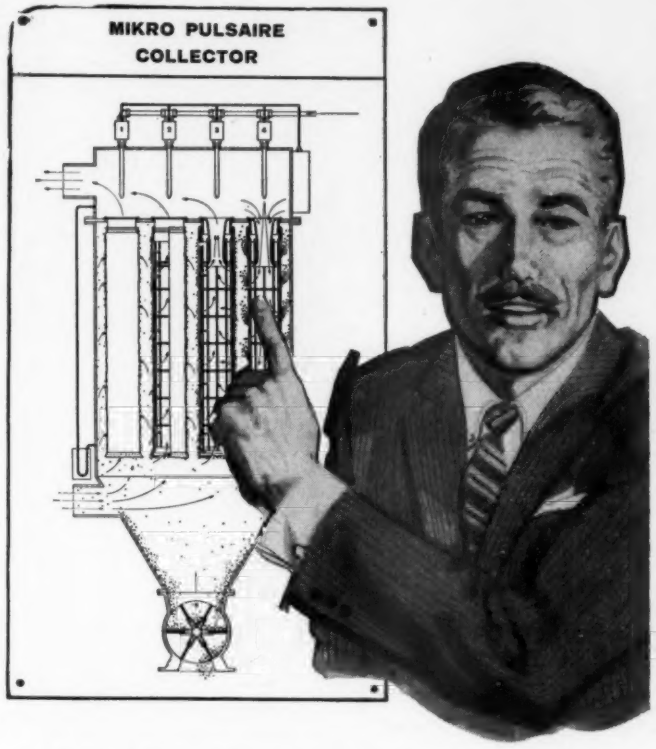
Capillary Air Washers . . . *Air & Refrigeration Corp.*
Controls . . . . . *Johnson Service Co.*



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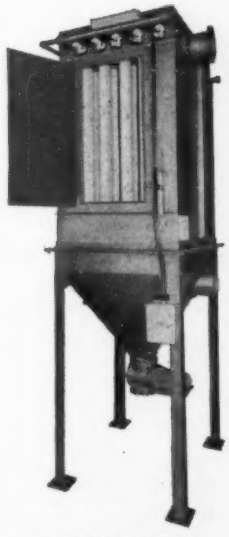
not even valves or dampers adjacent to collector!

That's why the MIKRO-PULSAIRE is the true economy dust collector . . . absolutely no internal mechanical moving parts! In radically simplified operation, filter elements are cleaned in a continuous cycle by introduction of momentary jets of high-pressure air through specially-contoured venturis mounted above each filter cylinder, individually controlled by a timed solenoid.

World-wide installations are proving the economy of the MIKRO-PULSAIRE through reports of drastically reduced maintenance down time . . . with filtering efficiencies of 99.9% plus, on a wide variety of dusts.

Write for Bulletin 52A, or call in the Mikro representative. Ask about the new MIKRO-PULSAIRE modular construction units with capacities from 20 cfm to any known requirement.



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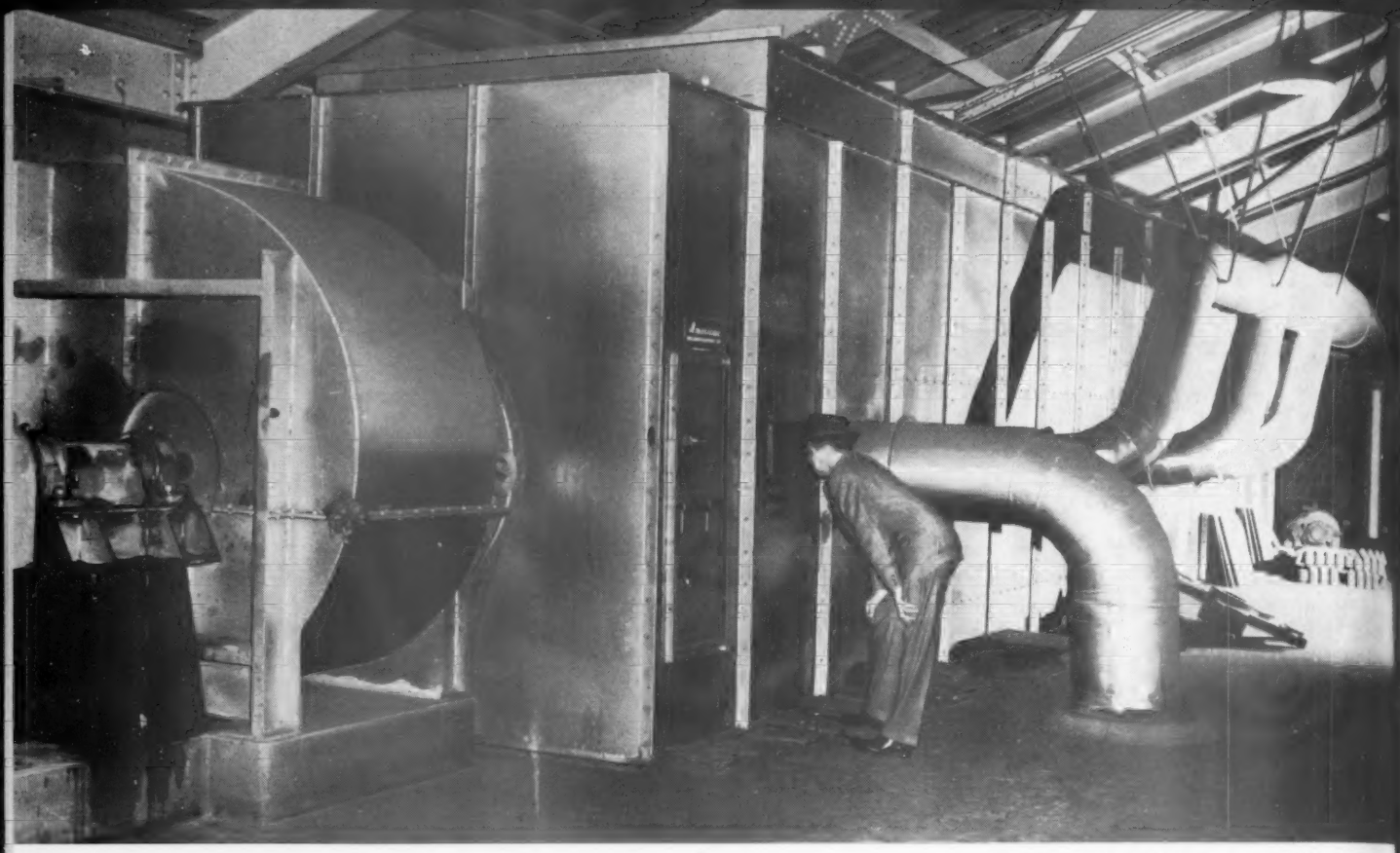

Fig. 2: Intermittent-type cloth filter dust collector handling 31,750 cfm of air vented from coal pulverizers.

For the steel industry . . .

All About Cloth Filter Collectors

by Robert T. Pring*

From the mine to the finished metal part, cloth collectors have applications in the steel industry. Author discusses baghouse applications throughout the entire industry.

THIS ARTICLE seeks to record the useful applications of cloth filter type dust and fume collectors — baghouses—in the steel industry for dust control or air pollution abatement. There are many manufacturers of this type of equipment, and the following discussion deals only with the *filtration principle,* not specific makes or designs of filtration equipment.

The following broad classification of steel mill operations indicates the areas in which dust control or air pollution control equipment may be applicable:

A. Materials Handling

Loading, dumping, conveying, crushing, screening, and storage of ore; coal and coke; sinter; fluxes; refractories; and pulverizing of coal.

B. Coke Ovens

Charging and "pushing"; quenching; and sizing, conveying and storage.

C. Sinter Plant

Sinter machine windbox gases; preparation of feed; handling sinter product.

D. Blast Furnace

Blast furnace gas.

E. Metal Refining

Open hearth furnace; oxygen converter; Bessemer converter; arc furnace.

F. Scarfing

G. Abrasive Cleaning

Ingots, slabs, billets, bars; ingot molds; and cold rolls.

H. Rolling Mills

Cooling electrical equipment.

Mr. Pring is manager, dust collector sales, Dracco Division, Fuller Company.

PICTURE CREDIT

All photos shown in this article courtesy Wheelabrator Corp.

Materials Handling

Past practice has been to install inertial-type dust collectors, such as cyclones, for cleaning exhaust ventilation air from most materials handling operations, although some wet scrubbers are in use. As air cleaning requirements are becoming more exacting, steel plant engineers and operators are turning to cloth filter type collectors, or "baghouses," which provide very high cleaning efficiency at moderate cost.

Fig. 1 illustrates a continuous automatic, cloth filter dust collector handling ventilation air from a dump pocket and crusher in a Taconite plant.

Fig. 2 shows a continuous automatic cloth filter handling bleed-off air from a closed circuit coal pulverizer.

Coke Ovens

Dust and air pollution control measures have largely been confined to mechanical improvements to the ovens and rigid control of operating and maintenance procedures. The effluent from quenching is mostly steam and is exhausted to atmosphere. Conventional dust collectors may be applied to conveying, screening, and storage operations, depending on the temperature and humidity of the ventilation air. No baghouses have been installed in coke plants of this type.

The recovery of coal tar chemicals from coke oven gases has greatly reduced air pollution.

Sinter Plants

Past practice has been to employ cyclones followed, in some cases, by electrostatic precipitators for windbox gases, and cyclones or scrubbers for local exhaust ventilation of dust points. Precipitators are not essential unless flue dust is returned to the sinter plant feed.

Pilot tests of baghouses using synthetic or glass filter fabrics have established the economic practicability of filtration of windbox gases. Some gas cooling may be required in view of reported gas temperatures ranging from 325° to 700°F. In many cases however, glass filter cloth operating at 550°F requires no auxiliary cooling equipment.

Every sinter plant includes a number of conveyors, chutes, screens, storage bins, etc., which require exhaust ventilation for dust control. Ventilating air from sintering machine discharge points may range up to 400°F, requiring glass filter bags but elsewhere Orlon (275°F) and cotton (180°F) are satisfactory. Dust collected by the filters is preferably returned to the sinter feed mixers after pugging with water to form a mud.

Regardless of the type of dust collector selected for sinter plant dust control, the application of sound engineering principles to the sizing and design of exhaust ventilating systems is a "must" if good results are to be obtained. The use of cloth filters in preference to less efficient equipment further improves atmospheric conditions inside and outside the plant.

Blast Furnaces

Blast furnace gas, because of its value as a fuel, requires a high degree of cleaning before it can be burned in auxiliary equipment. Current practice comprises first-stage washing of the gases leaving the blast furnace, followed by secondary cleaning by high efficiency washers (distintegrators) or wet Cottrell precipitators. The final dust concentration may be under 0.01 grains per cubic foot. Blast furnace "slips" may overload the gas cleaning equipment for brief periods as well as "blowing" dust direct to the atmosphere through furnace relief vents.

Open Hearth Furnaces

Because of the fineness of open hearth furnace fume, the uncontrolled stack effluent is conspicuous even though the maximum dust load does not exceed 2.0 grains per standard cubic foot, and the average is well under 1.0 grains per standard cubic foot (Table 1). The particle size ranges from 75 to 95 percent under 5 microns, with a typical median size of under 0.5 micron. The use of oxygen lancing to increase furnace production results in greater fume losses—3.5 grains per SCF, with one reported value of over 20 grains.

Where the location of the plant requires air pollution control equipment, recent practice has involved the installation of dry plate-type electrostatic precipitators. One single-furnace installation of a high

(Please turn to following page)

Fig. 1: Eight-compartment continuous automatic cloth filter type dust collector, handling 97,200 cfm exhaust ventilation air from a large primary crusher and dump pocket, at a taconite beneficiating plant (one of two units installed).

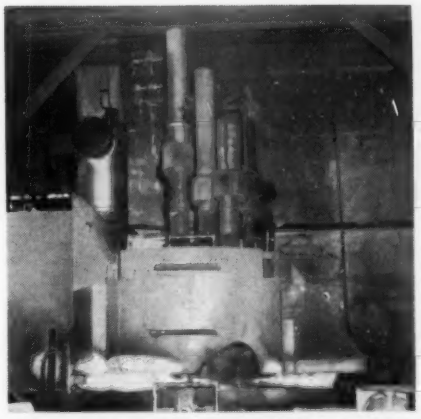

Fig. 3: Electric steel melting furnace with exhaust ventilation hood mounted on roof support beams. Furnace being oxygen lanced with roof raised. Ventilation system operating.

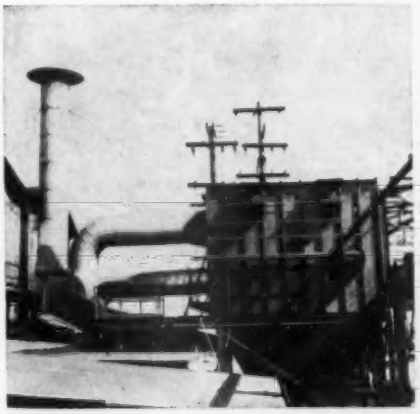

Fig. 4: Intermittent cloth dust collector filtering approximately 32,000 cfm of 200°F ventilation air from furnace in Fig. 3. Filter bags are shaken between heats.

Cloth Filters For The Steel Industry

(Continued from preceding page)

energy scrubber is in operation and extensive pilot scale testing of cloth filter collectors and slag wool moving-bed filters has been conducted. The dependable high efficiency of baghouses is attractive in many areas.

A pressure-type, weather-protected, glass baghouse installation costs about 75 percent as much as a comparable precipitator system, with maintenance costs in the same approximate range for both types of equipment. No auxiliary gas cooling is required if waste heat boilers are in place.

Oxygen Converters

Gas and fume evolution differ from that of open hearth furnaces mostly in higher and rapidly fluctuating gas temperatures (2800-3200 F max.) and higher fume concentrations (up to 8 grains per SCF). The time of a typical heat in an LD converter may run from 20 minutes to one hour.

The application of intermittent, pressure-type, glass baghouses shows promise. The filter bags may be cleaned between heats, eliminating auxiliaries for continuous filter operation. Gas cooling may utilize spray cooling, radiation or tempering air, or any combination of these methods.

Bessemer Converters

Until a suitable means of hooding Bessemer converters can be developed which will not require exorbitant gas volumes, the application of air pollution control equipment will continue to be economically infeasible.

Arc Furnaces

Some 150 or more commercial installations of electric steel melting furnace fume control equipment have been made over a 10-year period. Most of these utilize a roof-mounted hood; a few have canopy hoods located over crane rails and about 10 furnaces—mostly 50 tons capacity and up—are ventilated by direct evacuation of the furnace shell. Only those installations involving direct shell tap require auxiliary gas cooling. Early installations were equipped with orifice-type scrubbers which eliminated up to 75% by weight of the fume but, nonetheless, still permitted a visible effluent to escape. More recently, nearly all systems installed employed tubular, bag-type dust collectors; although a few systems employing orifice-type or high energy scrubbers or electrostatic precipitators are of recent origin.

Fig. 5: Cloth tube type dust collector ventilating a large airless abrasive blast cabinet descaling carbon steel strip.

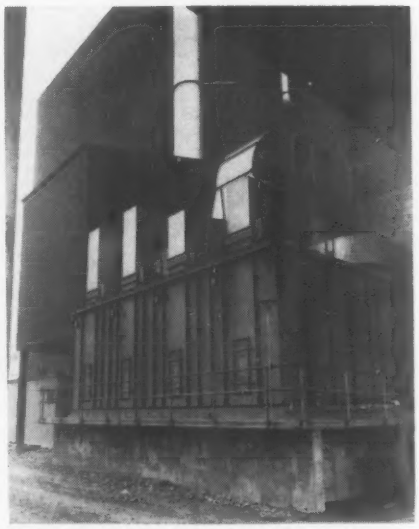

Fig. 6: Tubular-type cloth bag filter, used in ultra-filtration process, cleaning 90,000 cfm of atmospheric air for cooling roughing mill motors at a mid-west steel plant.

Dust loadings vary from 4 lbs. to 30 lbs. per ton of melt at a maximum of 3 grains per standard cubic foot. Effluent from the collectors must be below 0.05 grains per cubic foot if free from visible solids. This requirement is met with synthetic and glass filter media. Figs. 3 and 4 illustrate an arc furnace fume control system.

Scarfing

The problem of air pollution control of scarfing operations resolves into (a) estimation of gas volume, (b) hood design, and (c) control of water used for cooling the hood and the gases. There are a few satisfactory installations involving electrostatic precipitators for gas cleaning. The eventual use of filtration will depend on the control of water vapor introduced into the system.

Abrasive Cleaning

The widespread use of airless abrasive blast cleaning equipment for surface treatment of coiled strip, ingots, bars, and wire rods and for cleaning ingot molds has introduced many cloth filter dust collectors into steel plants. Filtration is the preferred method of controlling abrasive dust from this equipment. Fig. 5 illustrates a cloth tube type dust collector ventilating a large airless abrasive blast cabinet descaling carbon steel strip.

Ultra-Filtration

Filtered air is a must for cooling large rolling mill motors, motor generator sets, and other electrical equipment in steel plants. Other uses of clean air include turbo-blower intakes, instrument rooms, laboratories, and office spaces.

Low voltage electrostatic precipitators, viscous and throwaway filters, moving mats of glass fibers, and ultra-filtration are all widely employed for the above purposes in steel mills.

The ultra-filtration process utilizes relatively inexpensive cloth filter type industrial dust collectors in conjunction with a filter aid material deposited in the filter bags on start-up by the action of the entering air stream. The matrix of filter aid on the cloth provides immediate and exceptionally high filtering efficiency against fine particles of dust and tarry matter in outdoor air. The filter resistance increases almost imperceptibly so that shaking down the spent filter aid and replacing it is required only at intervals of six months to two years, depending on the degree of contamination of the raw air. In between recharging, there are no moving parts and no maintenance (Fig. 6).

Conclusion

The type of dust and air pollution control equipment best suited to steel mill operations will, in the last analysis, be decided upon on the basis of the efficiency required

(Please turn to page 41)

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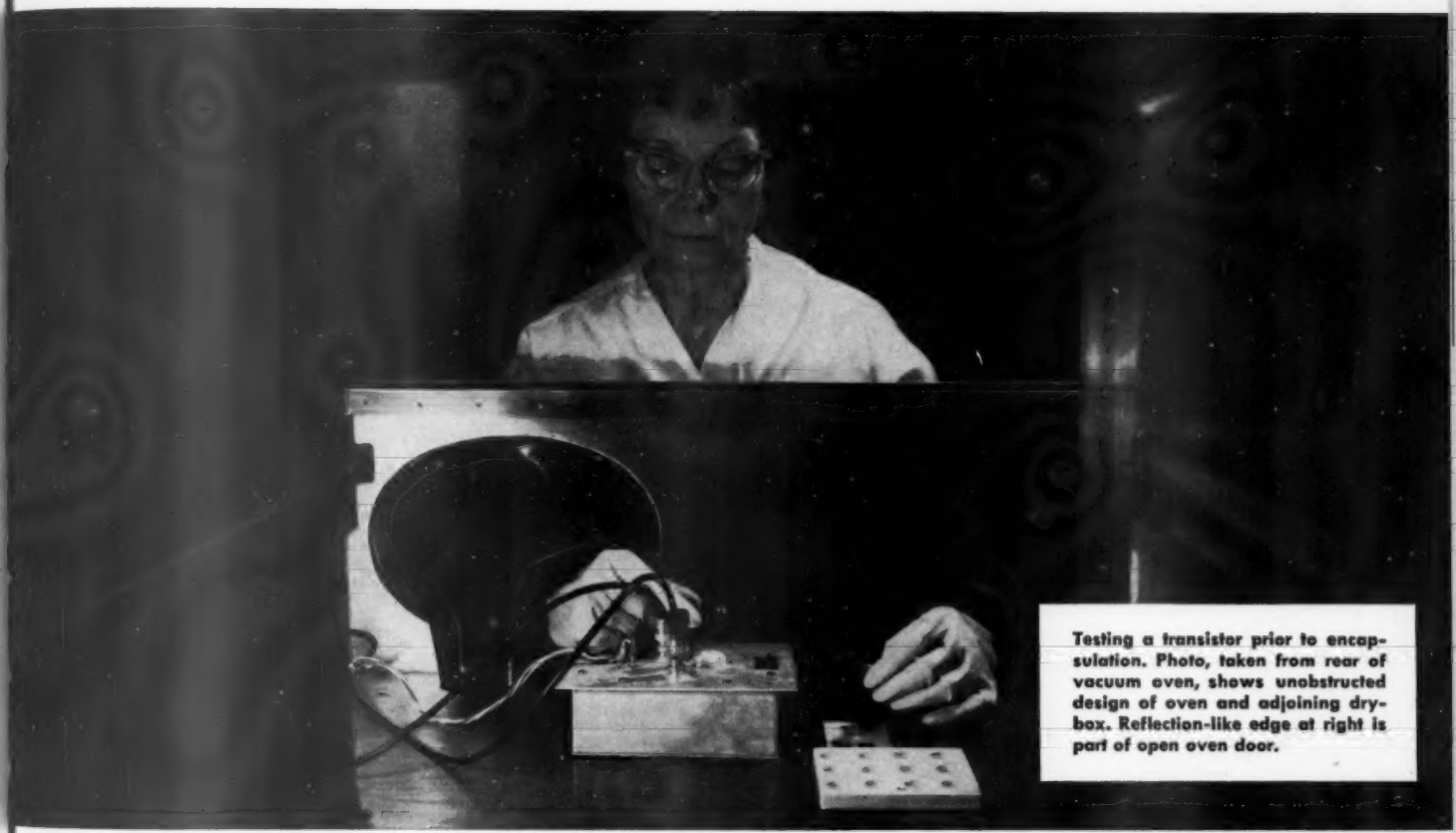

Testing a transistor prior to encapsulation. Photo, taken from rear of vacuum oven, shows unobstructed design of oven and adjoining drybox. Reflection-like edge at right is part of open oven door.

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[For more information circle #25 on page 55 reply cards]

A Practical Approach To The Problem Of Heating Large Glass Areas

Author tries six methods of heating large glass areas, shows that best way is with warm air system.

Photo courtesy Carrier Corp.

by Joseph B. Olivieri
J. B. Olivieri & Associates, Inc.
Consulting Engineers

RECENTLY OUR FIRM was commissioned to design the mechanical system for a fourteen story apartment building. This building is unusual in that its perimeter is constructed completely of sliding glass doors.

The prospects of attempting to maintain comfort conditions with this construction were frightening. It was decided, therefore, that a mock-up of a module of this apartment should be built so that various methods of heating these large glass areas could be tested.

It was decided to test a 72″ x 80″ sliding glass door. The frame of the door is aluminum and it is glazed in ½″ thermopane. The sliding door is installed in the writer's living room. A test facility was built around the sliding glass door (see Fig. 1). On the patio side an insulated cold room was built which could be cooled to -50°F. Within the living room a 7′ high x 6′ wide x 16′ long room was erected.

The room was built of tempered masonite and no attempt was made to insulate this room because the outer room could be maintained at a temperature that was close enough to the temperature of the test room to make heat transfer between the two rooms negligible.

Thermocouples were installed as shown on Fig. 2 to record the temperature of the aluminum frame at one point; the glass at three points; the room at three points; and the floor at one point. Temperatures were automatically recorded by a multipoint recorder.

The cold room was kept at -5°F while the following heating methods were tested:

1. Floor panel 4′ x 1′ and a ceiling panel 4′ x 1′ were both rated at 1000 watts, with a maximum temperature of about 500°F. Both panels were controlled by one line voltage thermostat. The thermostat maintained panel temperatures of about 250°F. (See Fig. 3.)
2. Ceiling panel 4′ x 1′ was rated at 1000 watts and controlled by a line voltage thermostat (Fig. 4).
3. A baseboard radiator rated at 1000 watts was installed under the glass and controlled by a line voltage thermostat (Fig. 5).
4. A baseboard radiator rated at 1000 watts was installed perpendicular to the glass and controlled by a line voltage thermostat. (Fig. 6.)
5. A ceiling panel and a baseboard radiator were under the glass. Both units were rated at 1000 watts and controlled by a line voltage thermostat. (See Fig. 7.)
6. Warm air was introduced through two 20″ x ½″ slots. The slots were centered on each three-foot

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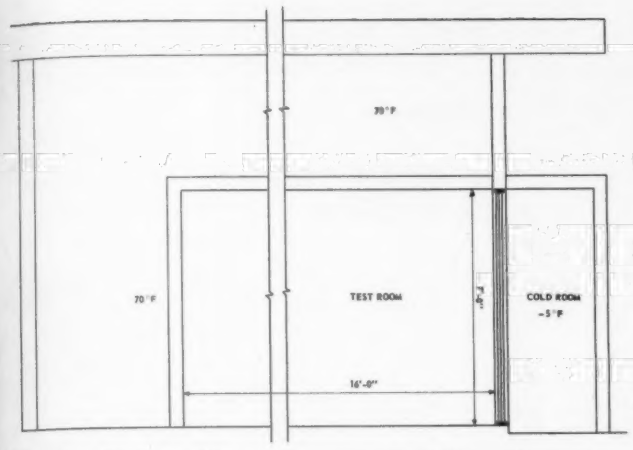

Fig. 1: Test facility built around sliding glass door.

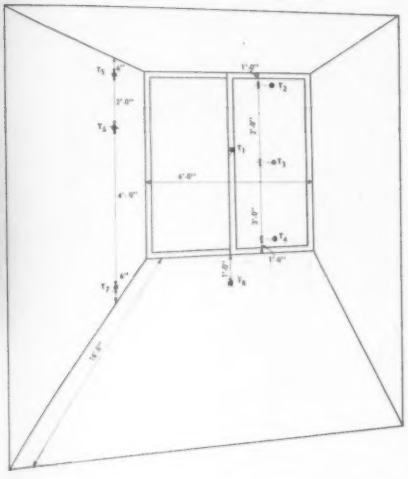

Fig. 2: Location of thermocouples.

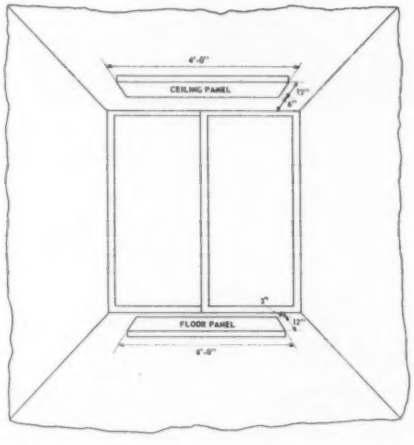

Fig. 3: Floor panel test set-up.

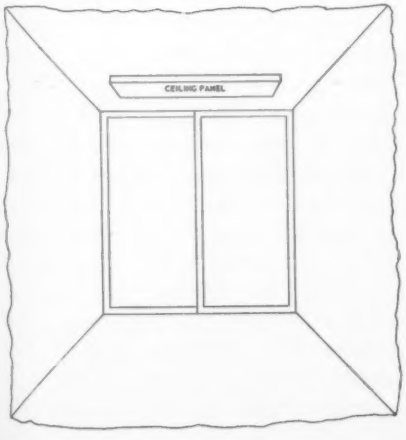

Fig. 4: Ceiling panel test set-up.

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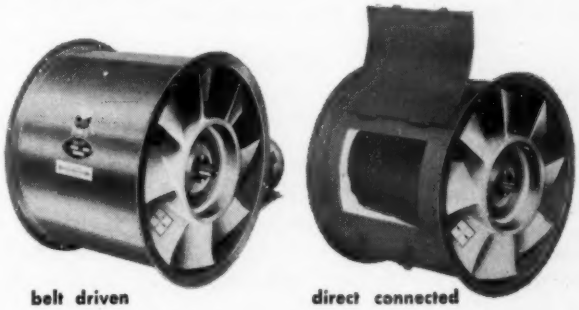

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[For more information circle #26 on page 55 reply cards]

WHY FILTER VENTILATION AIR?

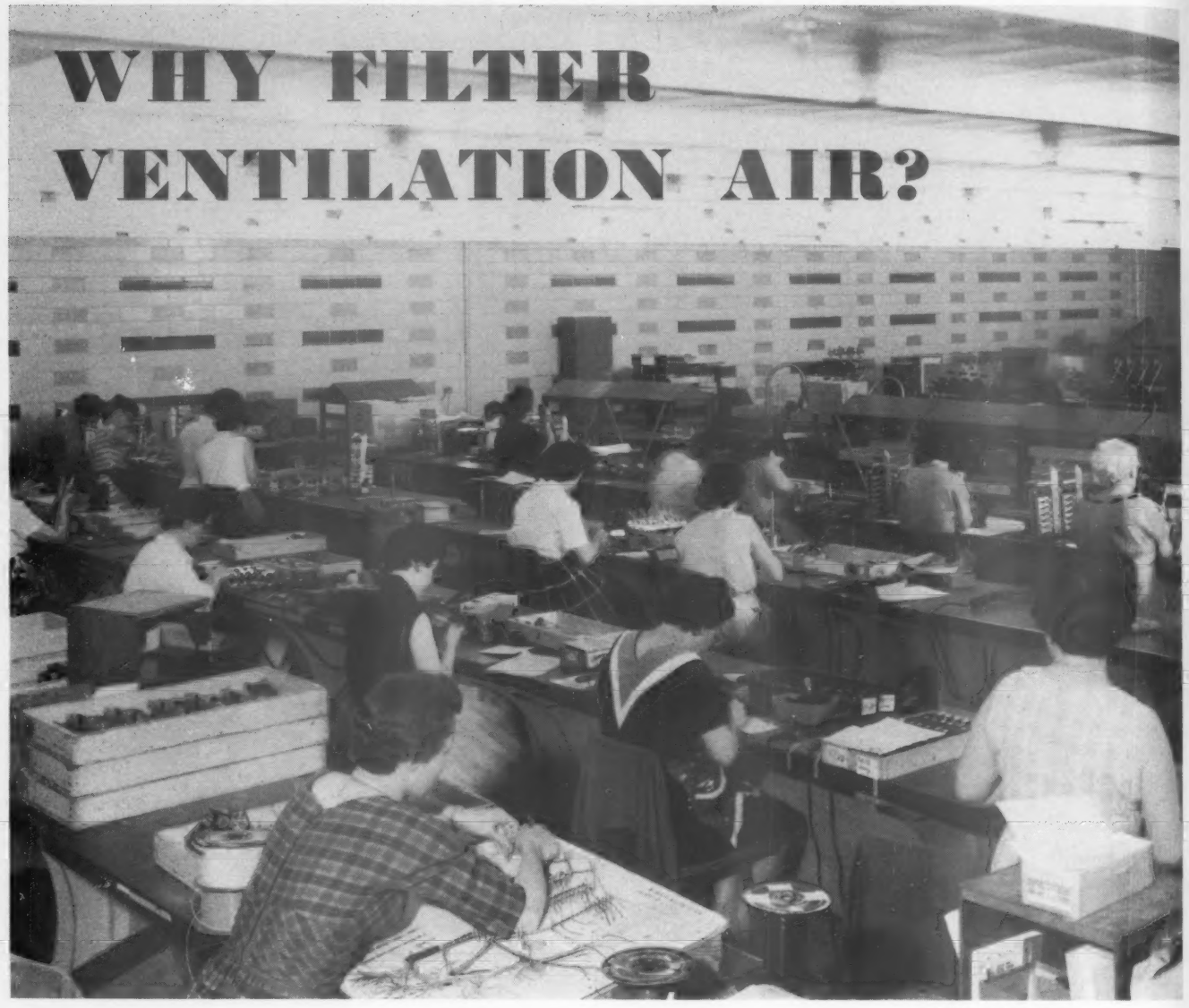

Photo courtesy
American Air Filter Co., Inc.

The case for clean air inside buildings can be made on a sound financial basis, as this article shows.

IF WE did not filter ventilation air, we would be subjected to the following conditions:

¶ Endangered health

Filters reduce pollen, bacteria, and germs.

¶ Added expense

Cleaning and painting everything constantly would cost as much as four times more.

¶ Reduced efficiency

In the office, factory, and home.

¶ Increased danger

Dirty ducts and dirty equipment create a fire hazard.

¶ Increased losses

In soiled merchandise and food.

According to Dr. Mark D. Hollis, U. S. Assistant Surgeon General, American industry and the people of the United States in particular should be awakened to the frightful fact that fresh air is fast becoming a rare commodity and unless rigid deterrent measures are taken, by 1970 this condition will have a marked effect on health.

Air pollution presently is responsible for four billion dollars a year in economic damage alone and these figures do not take into consideration the effect on public health or the ever increasing expense and bother of daily housecleaning. Recent tests in Louisville, Kentucky show an addition of 440 tons of man-made substances to the city's air daily; Seattle, Washington reports cars and trucks alone are adding 100 tons of irritating and destructive hydrocarbons a day to the atmosphere.

American industry, cognizant of the effects of impure air on product quality, employee morale, and plant efficiency are presently spending $300,000,000 per year on air pollution control and have even greater expenditures ear-marked for future research and control.

Add to this the fact that prac-

tically all states have enacted air pollution legislation and the Federal Government, under legislation passed in 1955, is quite active in research and control and is adamant concerning the necessity for these controls. Considering the foregoing, it is clear that fresh air is a problem.

A ventilating system is essentially a pump which draws raw polluted outside air into a building and after heating, cooling, or otherwise conditioning it, distributes this air throughout the building. It is a fact that in urban areas as much as 200 tons of air-borne dirt settles on a square mile each month. Building ventilating systems suck in thousands of cubic feet of air each minute and in doing so also draw in tons of this air-borne dirt. If the dirt is not removed by the ventilation system, everything in the building will become covered with this filth.

The most obvious result of dirty air intake would be the expense of constantly cleaning everything in the building. Walls, ceilings, and lighting fixtures would have to be cleaned 3 to 4 times as frequently as in a well filtered building, and the expense of cleaning and frequently replacing draperies would almost prohibit their use.

A less obvious, but extremely costly expense, would be the maintenance of the ventilating system itself. Dust and dirt would clog the heating and cooling coils makthe building hot in the summer and cold in winter. The fans and ductwork would become filled with dirt creating a fire hazard. No more dangerous building fire exists than the one in the ventilating system because it can be transmitted throughout the building almost at once. As an example of the cost of preventing such problems, the charge for duct cleaning approaches $1.00 per linear foot of duct.

Due to the demand for better air cleaning devices, there are now available high efficiency filters, and this equipment is proving its worth in the reduction of housekeeping costs. An intangible cost is the lowered efficiency of the occupants caused by discomfort and the resulting poor morale. Gritty and grimy desk tops soil clothing and papers causing annoyance and employee inefficiency.

In other types of buildings such as department stores, grocery stores, or small specialty shops, the losses due to soiled merchandise or contaminated food would be staggering. An examination of any outside ledge of a downtown building will give an idea of the filth that would be deposited on merchandise should good filters be left out of the ventilating system.

In its efforts to combat these problems, the Air Filter Industry has developed a wide variety of air cleaners and air filters. There are filters designed for almost every conceivable application, and by proper selection, air-borne dirt from the coarsest fly-ash to the finest of bacteria and radio-active material can be removed from the air. It is in the selection of the applicable filter that the engineer comes into his element, but the basic problems to be solved must always be kept in mind if the true value of air cleaners and air filters is to be understood. ▲▲

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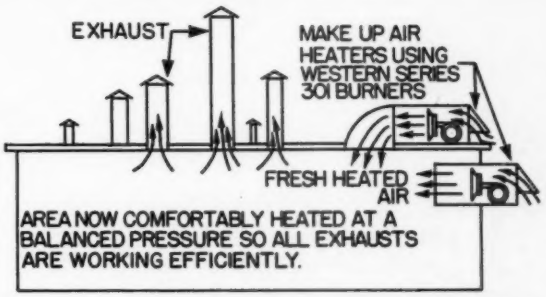
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MAKE UP AIR HEATERS USING WESTERN SERIES 301 BURNERS
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AREA NOW COMFORTABLY HEATED AT A BALANCED PRESSURE SO ALL EXHAUSTS ARE WORKING EFFICIENTLY.

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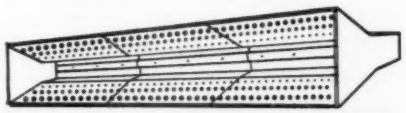

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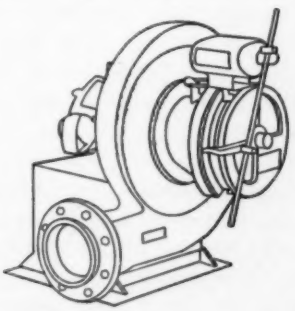

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Fabricated aluminum impeller. Heavy gauge steel case and base.

Patented Series 301 proportioning valve to accurately control the firing rate.

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[For more information circle #27 on page 55 reply cards]

Fig. 1: Typical coin operated dry cleaning establishment.

How Ten
Coin ero
Dry ni
Equer

by George Hama, *Consulting Edito*

Because solvent from dry cleaners are l, c tion is a "must." tell

THE COIN OPERATED dry cleaning machine is a completely automatic dry cleaning unit designed so that the customer can clean his own clothes. The customer follows this procedure: he weighs the clothes so the machine is not overloaded, tests plastic buttons for solubility in the cleaning solvent, pre-spots food soil spots with a water spray and then loads the clothes into the dry cleaning machine. The unit begins the cleaning cycle after he closes the door and inserts the correct number of coins (usually $1.50 to $2.00 in quarters).

After a period of approximately 45 to 60 minutes the cleaning cycle is completed and he can remove the clean clothes. In many cases the garments do not need pressing, if they are hung on hangers for a few minutes, as the process tends to remove small wrinkles rather than increase them.

The present available equipment does an excellent cleaning job at an attractive price. For this reason it is anticipated that coin operated dry cleaning establishments may become as popular as self-service automatic laundries.

However, unlike coin operated washing equipment which uses a non-toxic material, water, coin operated dry cleaning machines use a cleaning solvent, perchloroethylene, (tetrachloroethylene). This material has a moderate health severity hazard. Narcotic effects have been observed at concentrations in excess of 200 parts vapor per million parts of air. The recommended maximum exposure is 100 parts of vapor per a million parts of air[1]. This level is believed to represent a maximum exposure which should not be exceeded rather than an average level.

An indication of the relative toxicity is a comparison with carbon tetrachloride, which is highly toxic, with a maximum allowable concentration of 25 ppm and petroleum naphtha, which is of low to moderate toxicity with a maximum allowable concentration of 500 ppm[1].

Perchloroethylene can, however, be safely controlled. It has been used for a number of years as the principle solvent for commercial dry cleaning using a non-flammable synthetic fluid. The coin operated equipment, however, which will be open to the public, will be operated by inexperienced personnel uninitiated in proper safe dry-cleaning procedures. In some cases these persons may operate without the assistance of service attendants. It is important, therefore, that the equipment and the ventilation be as foolproof as possible and for the most part automatic.

To understand the controls a brief discussion of the units is

Fig. 2: Grilles below machine aid ventilation.

Ventilate erated ning Equent

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om coin operated l, careful ventila- tells how to do it.

needed. Fig. 1 and 2 illustrate the coin operated dry cleaning machines. The equipment usually consists of 8 lb. load units about the size of a domestic combination washer-dryer. The weighed clothes are loaded into a side door which has a tight gasketed fit to prevent escape of liquid and vapor.

To prevent accidents and spillage of solvent it is imperative that this door be equipped with an interlocking electrical switch which prevents operation of the machine until the door is tightly locked closed. The door must also have a positive locking device which will prevent the customer from opening it until the cleaning cycle is completed and the machine has stopped operating. It is also important that in the event the door gaskets become worn or damaged so that they leak, the solvent will not drain unto the floor and evaporate; provision should be made so that the solvent will drain into pans, gutters, or a diked area where the perchloroethylene can be directed and drained into a floor storage tank.

After the clothes are placed in the machine, the door closed and the coins inserted, solvent flows into the machine and the washing cycle begins which consists of an agitating action in the solvent. This washing cycle is regulated by a timer and generally lasts 15 to 20 minutes. When the washing cycle is completed the liquid is drained from the machine and the excess liquid is extracted from the clothes by centrifugal spinning which lasts for several minutes. Following this the clothes are dried free of solvent by passing heated air over them while they are subjected to a tumbling action. The proper drying period is highly important as incomplete drying will result in the clothes being removed laden with solvent. This will expose the customer to high concentration of perchloroethylene vapor.

Some manufacturers depend on a timed drying cycle to assure proper drying of the clothes; the use of sensing equipment to indicate when the clothes are dry would be an ideal method of control. The sensing equipment appears to have some advantage over the timed drying cycle control method as heavy padded, difficult-to-dry garments are unlikely to be released prematurely. A satisfactorily dried garment will have no odor, although a slight odor does not necessarily indicate a hazardous exposure. (The threshold of odor for perchloroethylene for most persons is 35 to 50 parts of vapor per a million parts of air).

To control any vapor within the machine and to assist in diluting any solvent on the clothes it is necessary that ventilation is turned on when the door is open, which will effect an air flow into

(Please turn to following page)

Coin Operated Dry Cleaners

(Continued from preceding page)

the door opening of at least 100 linear feet per minute.

The used solvent from a cleaning cycle is pumped in a closed system to equipment where it is conditioned by a clarifier and filter consisting of activated carbon, magnesia and diatomaceous earth. In time the clarifying system becomes loaded with sludge and dirt from the clothes. This sludge must be removed and new filter powders added. This operation requires the services of a trained attendant and sometimes involves some solvent vapor exposure. An organic vapor respirator should be used by the attendant. The solvent clarifying and regenerating equipment must be located in a ventilated room behind the cleaning units not accessible to the public. Fig. 3 illustrates this equipment and the exhaust ducts and fan ventilating the machines.

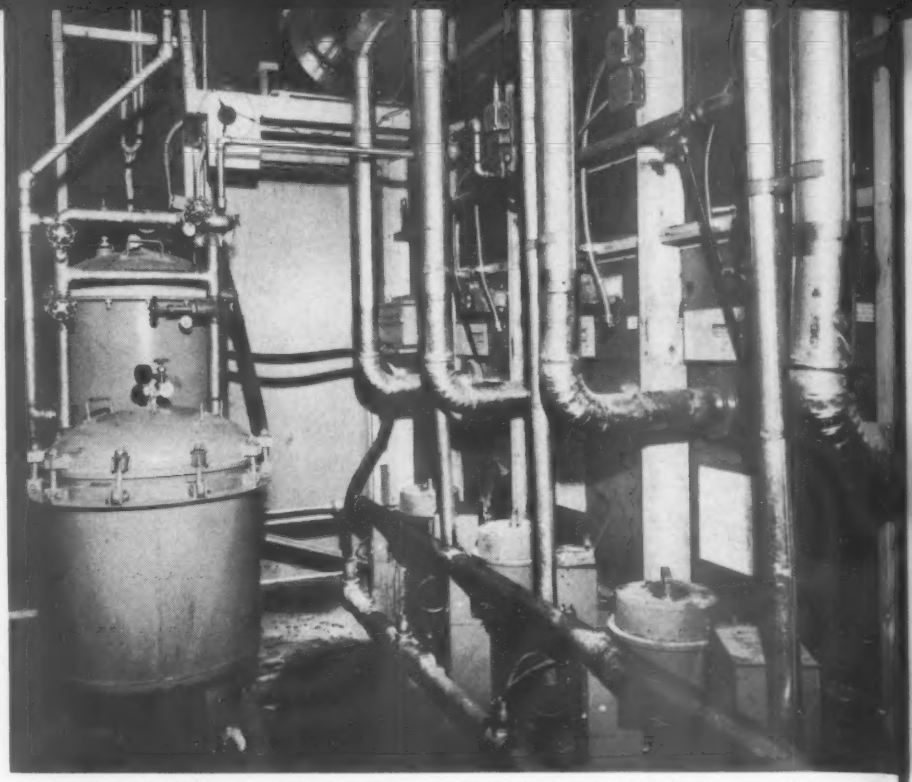

Fig. 3: Solvent clarifying and regenerating equipment, shown above, must be located in a well ventilated room to protect operator from toxic effects of the perchloroethylene solvent.

General Ventilation

Inasmuch as there is no ventilation from the machines when the doors are closed to take care of vapor exposures from residual solvent in clothes and possible machine leaks, it is necessary to provide some general ventilation. A good method is to exhaust air from grilles above or below the machines or through perforated paneling around the machine. This is illustrated in Figs. 1 and 2. A general ventilation rate of 350 to 500 cfm per machine has been found to give control[2].

The air is exhausted from the maintenance section in the rear and is then drawn through the grilles or opening over the machines in the customer section. This will also keep a negative pressure on the maintenance section and prevent the escape of vapors.

A heated supply air system should be provided to replace the air exhausted with tempered outdoor air. The make-up air unit should be located in the far side of the customer area so that the heated outdoor air sweeps the entire customer area before it is exhausted from the building. This system should be interlocked electrically with the exhaust ventilating system so the exhaust and supply ventilation are always on simultaneously.

A summary of controls necessary for safe operation are:

1. The loading door must be positively "interlocked" so that the machine will not start without the door being completely closed and so it cannot be accidentally opened until the entire cleaning cycle is completed.
2. When the loading door is opened the exhauster fan must be energized or damper opened so air is drawn into the machine at a rate of not less than 100 to 150 cubic ft. per minute per sq. ft. of door opening.
3. The drying cycle must be automatically regulated so that with both light and heavy clothes, adequate drying and solvent removal is accomplished. Although a timed cycle is usually employed, a sensing device which will continue the drying cycle until the clothes are free of solvent would be the preferred method of control. If a strong odor is present in the clothes, the drying is inadequate.
4. General ventilation consisting of both a heated supply system and an exhaust system must be provided. A good arrangement is to line up the machines at a partition or wall separating the front or customers' section from a rear maintenance section. Air is exhausted from the rear section with the air entering the grille over the machine, this in turn exhausts air from the customers' section, ventilating the machine area. A rate of 350 to 500 cfm per machine is recommended. The supply and exhaust should be electrically interlocked to go on together.
5. A satisfactory method should be provided to control and confine leaking solvent from the cleaning machines. This could include drain pans, or gutters, or some method of diking the floor so the solvent will not drain into the customers' section. The drained solvent should be directed or channeled into a closed holding tank.
6. Gas-fired space heaters and hot water heaters must be isolated from the cleaning operation so the combustion air does not come from the cleaning room.

(Please turn to page 41)

Centrally metered gas heating and cooling . . .

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CENTRAL air conditioning, included in the rent, is not only a convenience to the tenants, but it may also mean extra revenue to the owner.

For the 269-unit Ansley Forest garden apartment development in Atlanta, Georgia, J. W. O'Donnel, president of the owner-construction company, estimates that he will be able to realize about $5 more per apartment per month by contracting for gas from the local utility on a large volume commercial rate and selling it at the equivalent of the domestic rate. This applies for central air conditioning as well as for other needs, including central heating, domestic cooking, domestic water heating, decorative gas lighting, incinerators, laundry equipment, and heating of the swimming pool.

When completed the apartments can be rented at the going rate plus what the individual tenant would have to pay if he contracted for his own

(Please turn to following page)

FUEL COST ESTIMATES FOR THREE DIFFERENT SYSTEMS

	CENTRAL GAS SYSTEM	CENTRAL ELECTRIC SYSTEM	INDIVIDUAL UNIT ELECTRIC SYSTEM
Fuel Cost	$17,737.00	$49,587.00	$53,950.00
Auxiliaries	3,865.00	1,238.00	
Water	734.00	348.00	
Water Treatment	1,211.00	575.00	
Total Cost	$23,547.00	$51,748.00	$53,950.00
Cost per unit/yr.	87.53	192.37	200.56
Cost per unit/mo.	7.29	16.03	16.71

(Continued from preceding page)

utilities. Yet, by contracting for gas through a central meter, the owners obtain a better rate than the tenant would for individual supply through domestic meters. This difference in rate represents the owner's extra revenue.

The tenant, on the other hand, will find a central air conditioning system much more effective than individual room or apartment units, the owners believe. A central system can provide an almost unlimited extra cooling capacity to meet peak demands such as occur, for instance, when a tenant is host to a large number of guests. Individual units are limited in coping with extra loads. Moreover, a central system operates much more quietly.

Prepaid Heating And Cooling

Central air conditioning in multiple-story apartment houses is gaining increasing acceptance. For garden apartments, on the other hand, especially when scattered over a wide area, a central system is still somewhat of a novelty. Yet the Ansley Forest project proves that central air conditioning is not a luxury but a practical solution for garden apartments renting within a price range of $90 per month for an efficiency apartment to $175 for a three-bedroom unit, including air conditioning and other gas-fired appliances.

Designed by Albert O. Ordway, AIA, Atlanta architect, the 269 units of the Ansley Forest development occupy a plot measuring 600 ft. by 450 ft. by 100 ft. None of the 15 buildings exceeds four stories. The architect has taken advantage of the hilly terrain so that fourth floor residents will have to climb no more than one flight of stairs to reach their apartments.

A swimming pool is located in the center of the development. Next to it, underground, is an equipment room, containing the pumps, heater and filters required for the swimming pool, as well as the steam boiler, the water chiller, pumps, and other equipment required for the heating and air conditioning system. This central underground location has two advantages: it reduces length of supply lines to individual units to a minimum and replaces noisy equipment normally located in or near the living area.

Installation costs of the supply and return lines of the heating and air conditioning system were further minimized by laying them in the ditches required for the gas supply lines.

Eubanks Appliance Co., mechanical engineers on the project, calculated heat loss for the entire project at 6,491,000 Btu; heat gain at 3,862,800 Btu. The heating unit consists of a 12-million Btu input low pressure steam boiler with hot water heat exchanger. Hot water is circulated at 160° with a 20° temperature drop.

For the air conditioning system, a 310-ton absorption chiller was chosen, requiring about eight million Btu input of steam. Chilled water is circulated at 44° F with a 10° temperature rise. The same supply and return lines are used for both the heating and cooling systems. A switch from heating to cooling can be effected by remote control on a control panel in the manager's office. The controls operate motorized steam valves which in turn operate the control valves of the heating and air conditioning equipment.

Each room in the apartments is equipped with a fan-coil unit. Depending on the size of the room, either a 300 cfm, 400 cfm or 600 cfm fan-coil unit is used. The units are provided with three fan speeds which can be operated either manually or by thermostatic control.

In the selection of the air conditioning system, three different types were considered – individual electric units, a central electric centrifugal system, and gas-fired absorption chillers.

First Costs

Even though first costs of individual units were about $50,000 lower than for a central system, this solution was ruled out for three main reasons: (1) noisy operation; (2) low life expectancy (federal tax laws, for instance, permit write-off in 5 years as compared to 15 years for central system); and (3) high operating costs.

Between the two central systems, the choice was made in favor of the absorption chillers despite somewhat higher first costs – about $10,000 more with oil burner standby equipment, and about $4,000 more without standby equipment. Among the factors considered in favor of absorption equipment were: (1) availability of steam; (2) lower fuel costs; (3) simpler operation, eliminating the need for a skilled engineer, and less risk of damage to the equipment through mis-operation; and (4) quietness of operation.

Fuel Costs

Gas costs are based on year-round firm supply at 46 cents per 1000 cu. ft., with 1050 Btu gas. Electric rates for air conditioning are computed on a one cent per kwh basis although this is not usually available. The average load requirements per apartment per year were estimated conservatively at 1465 therms. This was based on actual observations made in other apartment units in Atlanta, none of which require more than 1200 therms per apartment per year.

The owner has not decided on whether to contract for firm or for interruptable gas service. In case he chooses interruptable service, his fuel costs will be further reduced by an estimated $3,000. In addition to the lower fuel costs, interruptable service has the advantage of the availability of an auxiliary fuel supply. ▲▲

Heating Large Glass Areas

(Continued from page 30)

panel of glass. The fan ran continuously and the 1000 watt heating element was controlled by a line voltage thermostat. (The air quantity was 100 cfm.) Return air was located at the floor, 14′-0″ from the glass.

Each of the above set-ups was tested for eight hours. The writer's wife sat 1′-0″ from the glass for ten-minute periods and from her reactions the degree of comfort was determined.

Electricity was used for the sake of convenience. Equal results would have resulted with hot water.

No Comfort At -5°

It would appear that there is no comfort at -5°F; that while sitting next to floor to ceiling glass only varying degrees of discomfort prevail. The only solution that can be offered is to sit at least four feet from the glass. While the results from the high temperature ceiling panels were disappointing, it would seem that this is a promising path for future research. If the glass industry could produce a glass that will reflect radiation, I believe that good comfort conditions would result. (Perhaps the present heat absorbing glass would work.)

(Please turn to following page)

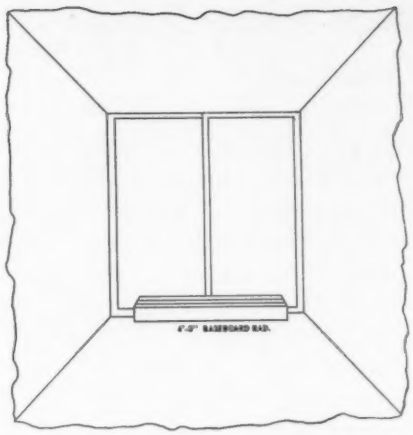

Fig. 5: Baseboard radiator test set-up.

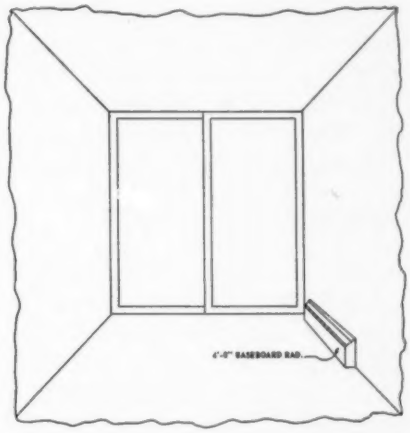

Fig. 6: Baseboard radiator perpendicular to glass test set-up.

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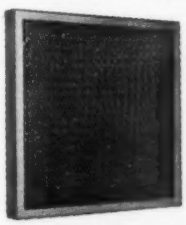

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Heating Large Glass Areas

(Continued from preceding page)

All testing was done on thermopane glass; the writer shudders when he thinks of the conditions that would have resulted from single glass.

The warm air system, contrary to popular opinion, was the most comfortable system tested. This system seems to provide a warm blanket between the subject and the glass. Also, the warm air system provided the least room floor to ceiling temperature difference. Note that the room was cooler at the ceiling and not warmer as is commonly thought.

The window industry should examine its use of aluminum frames. Why use thermopane to cut down heat transfer and then set it in a frame that is almost a perfect conductor? (The window tested is rated as one of the better windows.) The reasons for the use of aluminum are good and valid but something should be done to reduce the heat transfer.

Conclusions

We concluded, from the above study, that it is essential that thermopane be used when large glass areas are installed. It would also be wise to reduce the amount of glass in a building if the building is constructed in an area where outside air temperature is constantly below 20°F. ▲▲

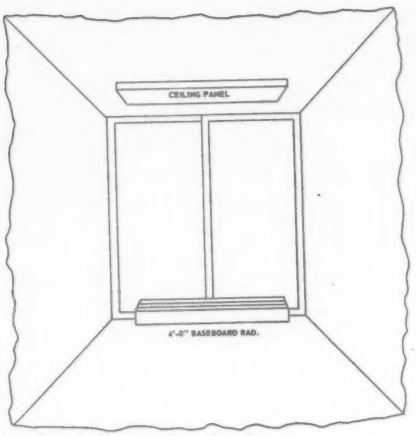

Fig. 7: Ceiling panel and baseboard radiator under the glass test set-up.

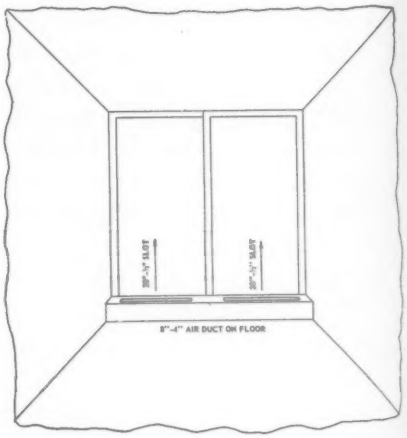

Fig. 8: Warm air test set-up.

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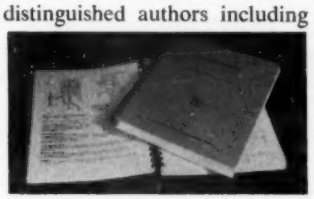

Coin Operated Dry Cleaners

(Continued from page 36)

A few parts per million of perchloroethylene form an extremely corrosive gas when it contacts open flames. This will quickly corrode out the heat interchanger and flue pipe.

7. No odor masking agent should be used in the perchloroethylene, because the distinctive odor serves as a warning of the presence of the solvent.
8. Adequate step-by-step instructions should be posted. Instructions should include materials and articles *not* to be cleaned: i.e. leather goods, sleeping bags, material containing plastic or rubber foam. These articles normally are difficult to dry and the carry-out of solvent may be high. ▲▲

REFERENCES

(1) Industrial Health Conference, *Threshold Limits,* Committee, American Conference of Governmental Industrial Hygienists, April, 1961.

(2) Coin-op Dry Cleaning—New Development. *Mich. Occupational Health,* Vol. 6, No. 2, Winter 1960-61.

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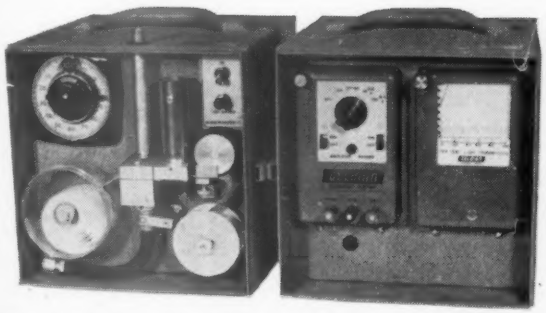

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[For more information circle #33 on page 55 reply cards]

Cloth Filters For The Steel Industry

(Continued from page 28)

and the cost of installing, operating, and maintaining the various available devices. Space requirements are greater for baghouses than for some other types and, in steel mills, space is frequently a problem. Fortunately, a baghouse is a flexible device dimensionally, and length, width, and height can be altered to fit individual restrictions.

It is significant that cloth filtration is meeting with constantly increasing favor and acceptance in heavy industry. Continued research in filter fabrics and mechanical design will increase the usefulness of filtration equipment. ▲▲

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Products are listed in alphabetical order insofar as it is practical, under the name which in our opinion is most commonly used. You can find the product for which you are looking by checking first the category under which it falls, then the product listing. Then check the alphabetical listing of manufacturers for complete name and address of the supplier. While every effort has been made to insure accuracy of listings, the publisher is not responsible for any errors herein. We will be glad to make corrections in future directories.

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Dust Level

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Chicago Air Filter Co.
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Snow Filtration Co.
Technical Filter Co.

Automatic

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Chicago Air Filter Co.
Continental Air Filters, Inc.
Farr Co.
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Koppers Co., Inc., Metal Products Div.
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Morris Deodorizers, Inc., Electronics Div.
Rockwell Standard Corp., Air-Maze Div.
Wheelabrator Corp.

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Western Precipitation Div.
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Sly Mfg. Co., W. W.
Torit Mfg. Co.
Wagner Awning & Mfg. Co., The
Wheelabrator Corp.
Wood Co., John,
Air Pollution Control Div.

Bag Filter Media (Glass Fibers)

American Air Filter Co., Inc.
Buell Engineering Co., Inc.,
Northern Blower Div.
Chicago Air Filter Co.
Criswell Co., Inc., W. W.
Ducon Co., Inc., The
Fabric Specialties, Inc.
Fuller Co.,
Dracco Div.
Industrial Sheet Metal Works
Joy Mfg. Co.,
Western Precipitation Div.
MacLeod Co., The
Menardi & Co.
National Filter Media Corp.
Owens-Corning Fiberglas Corp.
Pangborn Corp.
Rees Blower Pipe Mfg. Co.
Sly Mfg. Co., W. W.
Snow Filtration Co.
Sterling Blower Co.
Stevens & Co., Inc., J. P.
Technical Fabricators, Inc.
Vacculator Co. Inc.
Wagner Awning & Mfg. Co., The
Wheelabrator Corp.
Wood Co., John,
Air Pollution Control Div.

Bag Filter Media (Other Than Glass Fiber)

Aget Mfg. Co.
American Air Filter Co., Inc.
American Felt Co.
Arco Mfg. Corp.
Bemis Brother Bag Co.
Buell Engineering Co., Inc.,
Northern Blower Div.
Chicago Air Filter Co.
Criswell Co., Inc., W. W.
Ducon Co., Inc., The
Dust Control Co.
Fabric Specialties, Inc.
Fuller Co.,
Dracco Div.
Industrial Sheet Metal Works
Joy Mfg. Co.,
Western Precipitation Div.
Kleissler Co., G. A.
Koppers Co., Inc.,
Metal Products Div.
MacLeod Co., The
Menardi & Co.
National Filter Media Corp.
Pangborn Corp.
Rees Blow Pipe Mfg. Co.
Sly Mfg. Co., W. W.
Snow Filtration Co.
Sterling Blower Co.
Technical Fabricators, Inc.
Travis Mills Corp.
Vacculator Co. Inc.
Wagner Awning & Mfg. Co., The
Wellington Sears Co., Inc.
Wheelabrator Corp.
Wood Co., John,
Air Pollution Control Div.

Baghouses (Complete Installations)

Aget Mfg. Co.
Bristol Sheet Metal Co.
Buell Engineering Co., Inc.,
Northern Blower Div.
Day Co., The
Ducon Co., Inc., The
Dust Control Co.
DustEnder Co.
Dustex Corp.
Fuller Co.,
Dracco Div.
Joy Mfg. Co.,
Western Precipitation Div.
Kleissler Co., G. A.
Koppers Co., Inc.,
Metal Products Div.
Ohio Blow Pipe Co.
Pangborn Corp.
Pulverizing Machinery Co.
Rees Blow Pipe Mfg. Co.
Ruemelin Mfg. Co.
Sly Mfg. Co., W. W.
Sterling Blower Co.
Technical Fabricators, Inc.
Torit Mfg. Co.
Wheelabrator Corp.
Wood Co., John,
Air Pollution Control Div.

Bags, High Temperature (Above 230°F)

American Air Filter Co., Inc.
American Felt Co.
Bemis Brother Bag Co.
Buell Engineering Co., Inc.,
Northern Blower Div.
Chicago Air Filter Co.
Coast Mfg. & Supply Co.
Criswell Co., Inc., W. W.
Ducon Co., Inc., The
DustEnder Co.
Fabric Specialties, Inc.
Fuller Co.,
Dracco Div.
Joy Mfg. Co.,
Western Precipitation Div.
Kleissler Co., G. A.
Koppers Co., Inc.,
Metal Products Div.
Menardi & Co.
Modern Dust Bag Co., Inc.
National Filter Media Corp.
Owens-Corning Fiberglas Corp.
Pangborn Corp.
Pulverizing Machinery Co.
Robbins & Myers Inc.
Sly Mfg. Co., W. W.
Snow Filtration Co.
Sterling Blower Co.
Stevens & Co., Inc., J. P.
Technical Fabricators, Inc.
Wagner Awning & Mfg. Co., The
Wheelabrator Corp.
Wood Co., John,
Air Pollution Control Div.

Bags, Low Temperature (Below 230°F)

Aget Mfg. Co.
American Air Filter Co., Inc.
American Blow Pipe Co. Inc.
American Felt Co.
Bemis Brother Bag Co.
Buell Engineering Co., Inc.,
Northern Blower Div.
Chicago Air Filter Co.
Criswell Co., Inc., W. W.
Ducon Co., Inc., The
Dust Control Co.
DustEnder Co.
Fabric Specialties, Inc.
Fuller Co.,
Dracco Div.
Griffin Industries, Inc.
Hald Pneumatic Systems
Industrial Sheet Metal Works
Joy Mfg. Co.,
Western Precipitation Div.
Kleissler Co., G. A.
Koppers Co., Inc.,
Metal Products Div.
Menardi & Co.
Modern Dust Bag Co., Inc.
National Filter Media Corp.
Pangborn Corp.
Pulverizing Machinery Co.
Robbins & Myers Inc.

Sly Mfg. Co., W. W.
Snow Filtration Co.
Technical Fabricators, Inc.
Vacculator Co., Inc.
Wagner Awning & Mfg. Co., The
Wheelabrator Corp.
Wood Co., John,
Air Pollution Control Div.

Envelope Screen Collectors

Bristol Sheet Metal Co.
Criswell Co., Inc., W. W.
Hald Pneumatic Systems
MacLeod Co., The
Menardi & Co.
National Filter Media Corp.
Pangborn Corp.
Robbins & Myers Inc.
Sly Mfg. Co., W. W.
Snow Filtration Co.
Technical Fabricators, Inc.
Torit Mfg. Co.
Vacculator Co. Inc.

Reverse Jet, Felt Media

American Air Filter Co., Inc.
American Felt Co.
Bemis Brother Bag Co.
Criswell Co., Inc., W. W.
Day Co., The
Dustex Corp.
Fabric Specialties, Inc.
Joy Mfg. Co.,
Western Precipitation Div.
Koppers Co., Inc.,
Metal Products Div.
National Filter Media Corp.
Pulverizing Machinery Co.
Sly Mfg. Co., W. W.
Snow Filtration Co.
Technical Fabricators, Inc.

DUST COLLECTORS, SONIC

Union Industrial Equipment Corp.
(100% solid state continuous operation)

DUST COLLECTORS, UNIT

Portable Or Small Units For Low Dust Loading Intermittent Operation

Aerotec Industries, Inc.,
Industrial Div.
Aget Mfg. Co.
Air Filter Corp.
Allington & Curtis Mfg. Co.
American Air Filter Co., Inc.
American Blow Pipe Co. Inc.
Associated Mills, Inc.
Barnebey-Cheney
Bristol Sheet Metal Co.
Buell Engineering Co., Inc.,
Northern Blower Div.
Cambridge Filter Corp.
Chicago Air Filter Co.
Cincinnati Electrical Tool Co.
Cincinnati Fan & Ventilator Co.
Clements Mfg. Co.
Day Co., The
Ducon Co., Inc., The
Dust Control Co.
DustEnder Co.
Fly Ash Arrestor Corp., The
Fuller Co.,
Dracco Div.
Gelman Instrument Co.
Gerwin Electronics Inc.
Griffin Industries, Inc.
Heil Process Equipment Corp.
Industrial Sheet Metal Works
Kirk & Blum Mfg. Co., The
Kleissler Co., G. A.
Mine Safety Appliances Co.
Morris Deodorizers, Inc.,
Electronics Div.
Ohio Blow Pipe Co.
Pangborn Corp.
Radex Corp.
Robbins & Myers Inc.
Ruemelin Mfg. Co.
St. Louis Blow Pipe Co.
Schutte & Koerting Co.
Sly Mfg. Co., W. W.
Sprout, Waldron & Co., Inc.
Sterling Blower Co.
Torit Mfg. Co.
Trion, Inc.
Vacculator Co. Inc.
Wallace & Tiernan Inc.
Wheelabrator Corp.
Wood Co., John,
Air Pollution Control Div.

DUST COLLECTORS, WET

Air Washers

Air & Refrigeration Corp.
American Incinerator Corp.
Automotive Rubber Co., Inc.,
Process Equipment Div.
Buffalo Forge Co.
Carrier Air Conditioning Co.
Clarage Fan Co.
DeVilbiss Co., The,
Metal Fabricators Div.
Griffin Industries, Inc.
Hald Pneumatic Systems
Industrial Plastic Fabricators, Inc.
Knight Co., Maurice A.
Marlo Coil Co.
Pyro Incinerator & Supply Corp.
Western Blower Co.

Cyclone Spray Scrubbers

Allington & Curtis Mfg. Co.
American Blow Pipe Co. Inc.
American Incinerator Corp.
Automotive Rubber Co., Inc.,
Process Equipment Div.
Bartlett-Snow-Pacific Inc.
Bristol Sheet Metal Co.
Buell Engineering Co., Inc.
Buffalo Forge Co.
Centri-Spray Corp.
Ducon Co., Inc., The
Heil Process Equipment Corp.
Kleissler Co., G. A.
Mahon Co., The R. C.
Ohio Blow Pipe Co.
Peabody Engineering Corp.
Rees Blow Pipe Mfg. Co.
Renneburg & Sons Co., Edward
Schutte & Koerting Co.
United States Stoneware Co., The
Wood Co., John,
Air Pollution Control Div.

High Efficiency, Impingement Type

Peabody Engineering Corp.

High Efficiency, Medium Pressure, Dynamic

Dust Suppression & Engineering Co.

High Efficiency, Medium Pressure, Low Orifice, Tower Type

Aerotec Industries, Inc.,
Industrial Div.
Automotive Rubber Co., Inc.,
Process Equipment Div.
Buffalo Forge Co.
Ducon Co., Inc., The
Fly Ash Arrestor Corp., The
Heil Process Equipment Corp.
Johnson-March Corp., The
Joy Mfg. Co.,
Western Precipitation Div.
National Dust Collector Corp.
Pangborn Corp.
Peabody Engineering Corp.
Schneible Co., Claude B.
United States Stoneware Co., The
Wood Co., John,
Air Pollution Control Div.

High Efficiency, Venturi Type

Aerotec Industries, Inc.,
Industrial Div.
American Air Filter Co., Inc.
Automotive Rubber Co., Inc.,
Process Equipment Div.
Buell Engineering Co., Inc.
Chemical Construction Corp.
Ducon Co., Inc., The
Joy Mfg. Co.,
Western Precipitation Div.
Peabody Engineering Corp.
Sargent Building Specialties Inc.
Schutte & Koerting Co.
United States Stoneware Co., The
Wood Co., John,
Air Pollution Control Div.

Low Pressure Drop, Impingement Type

Allington & Curtis Mfg. Co.
American Air Filter Co., Inc.
Antipol Corp.
Automotive Rubber Co., Inc.,
Process Equipment Div.
Buell Engineering Co., Inc.,
Northern Blower Div.
Buffalo Forge Co.
Chemical Construction Corp.
Chicago Air Filter Co.
Heil Process Equipment Corp.
Joy Mfg. Co.,
Western Precipitation Div.
Nash, Cadmus & Voelker, Inc.
Pangborn Corp.
Sargent Building Specialties Inc.
Schutte & Koerting Co.
United States Stoneware Co., The

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Spray Chambers

American Incinerator Corp.
Bahnson Co., The
Bartlett-Snow-Pacific Inc.
Carrier Air Conditioning Co.
Centri-Spray Corp.
Dust Control Co.
Haveg Corp.
Heil Process Equipment Corp.
Herrick Co., George S.
Incinerator Products Co.
Koch Sons Inc., George,
Wilco Refuse Burner Div.
Mahon Co., The R. C.
Nash, Cadmus & Voelker, Inc.
Pyro Incinerator & Supply Corp.
Sargent Building Specialties Inc.
Schutte & Koerting Co.
Wood Co., John,
Air Pollution Control Div.

Spray Towers

American Incinerator Corp.
Automotive Rubber Co., Inc.,
Process Equipment Div.
Chemical Construction Corp.
Griffin Industries, Inc.
Haveg Corp.
Heil Process Equipment Corp.
Renneburg & Sons Co., Edward
Wood Co., John,
Air Pollution Control Div.

FOG FILTERS, ATOMIZING SCRUBBERS

Venturi Injector Scrubbers

Beetle Plastics Corp., Carl W.
Ceilcote Co., Inc., The
Haveg Corp.
Joy Mfg. Co.,
Western Precipitation Div.
Schutte & Koerting Co.
United States Stoneware Co., The

Water-Jet Scrubbers

Argo Plastic Products Co.
Automotive Rubber Co., Inc.,
Process Equipment Div.
Beetle Plastics Corp., Carl N.
Buffalo Forge Co.
Carpart Corp.
Ceilcote Co., Inc., The
Haveg Corp.
Joy Mfg. Co.,
Western Precipitation Div.
Mahon Co., The R. C.
Schutte & Koerting Co.
United States Stoneware Co., The

FOG FILTERS, DEFLECTOR WASHERS

Deflector Washers, Non-Mechanical

Master Fan Corp.

Wetted Filters

Buffalo Forge Co.
Cincinnati Fan & Ventilator Co.
DustEnder Co.
Heil Process Equipment Corp.

FOG FILTERS, MECHANICAL SCRUBBERS

Disintegrator (Theisen Type)

Buffalo Forge Co.
Koppers Co., Inc.,
Engineering & Construction Div.

HOODS AND DUCTS

Corrosion Resistant

Argo Plastic Products Co.
Carpart Corp.
Ceilcote Co., Inc., The
Flexaust Co., The
Flexible Tubing Corp.
Gustin-Bacon Mfg. Co.
Heil Process Equipment Corp.
Industrial Plastic Fabricators, Inc.
Porter Co., H. K.,
Thermoid Div.

INCINERATORS, APARTMENT HOUSE

American Incinerator Corp.
(flue fed, portable type)
American Incinerator Corp.
(central unit)
Brule Incinerator Corp.
(interlock control, multi-chamber type)
Canton Stoker Corp.
(brick set type)
Goder Incinerators, Joseph
(flue fed type)
Goder Incinerators, Joseph
(destructors)
Incinerator Products Co.
(direct or flue fed type)
Morse Boulger, Inc.
(flue fed type)
Nash, Cadmus & Voelker, Inc.
Peabody Engineering Corp.
(after burners)
Peabody Engineering Corp.
(over-fired air systems)
Peabody Engineering Corp.
(hopper locks)
Plibrico Co.
(multi-chamber type)
Pyro Incinerator & Supply Corp.
(flue fed type)
Sargent Building Specialties Inc.

INCINERATORS, HOSPITAL

American Incinerator Corp.
(pathological, garbage, rubbish)
Brule Incinerator Corp.
(general waste)
Brule Incinerator Corp.
(medical waste)
Canton Stoker Corp.
(brick set type)
Flynn & Emrich Co.
Goder Incinerators, Joseph
(medical waste)
Goder Incinerators, Joseph
(destructors)
Incinerator Products Co.
(direct or flue fed type)
Morse Boulger, Inc.
Nash, Cadmus & Voelker, Inc.
Plibrico Co.
(multi-chamber type)
Pyro Incinerator & Supply Corp.
(general hospital refuse)
Pyro Incinerator & Supply Corp.
(pathological)
Sargent Building Specialties Inc.
Washburn & Granger, Inc.
(pathological and medical waste)

INCINERATORS, INDUSTRIAL

Front Charging

American Incinerator Corp.
Brule Incinerator Corp.
Canton Stoker Corp.
Detrick Co., M. H.
Flynn & Emrich Co.
Goder Incinerators Joseph
Incinerator Products Co.
Morse Boulger, Inc.
Nash, Cadmus & Voelker, Inc.
Plibrico Co.
Pyro Incinerator & Supply Corp.
Renneburg & Sons Co., Edward
Sargent Building Specialties Inc.
Washburn & Granger, Inc.

Side Charging

American Incinerator Corp.
Canton Stoker Corp.
Detrick Co., M. H.
Goder Incinerators, Joseph
Incinerator Products Co.
Morse Boulger, Inc.
Nash, Cadmus & Voelker, Inc.
Plibrico Co.
Pyro Incinerator & Supply Corp.
Renneburg & Sons Co., Edward
Sargent Building Specialties Inc.
Washburn & Granger, Inc.

Top Charging

American Incinerator Corp.
Brule Incinerator Corp.
Canton Stoker Corp.
Detrick Co., M. H.
Flynn & Emrich Co.
Goder Incinerators, Joseph
Incinerator Products Co.
Morse Boulger, Inc.
Nash, Cadmus & Voelker, Inc.
Plibrico Co.
Pyro Incinerator & Supply Corp.
Renneburg & Sons Co., Edward
Sargent Building Specialties Inc.
Washburn & Granger, Inc.

INCINERATORS, MUNICIPAL

Batch Type

American Incinerator Corp.

Brule Incinerator Corp.
Detrick Co., M. H.
Flynn & Emrich Co.
Incinerator Products Co.
Pittsburgh-Des Moines Steel Co.
Plibrico Co.
Pyro Incinerator & Supply Corp.
Renneburg & Sons Co., Edward
Sargent Building Specialties Inc.

Cell Type

Brule Incinerator Corp.
Detrick Co., M. H.
Flynn & Emrich Co.
Morse Boulger, Inc.
Pittsburgh-Des Moines Steel Co.
Plibrico Co.
Pyro Incinerator & Supply Corp.
Renneburg & Sons Co., Edward
Sargent Building Specialties Inc.

Continuous Flow

Dravo Corp.

Mechanical Stoking

American Incinerator Corp.
Brule Incinerator Corp.
Detrick Co., M. H.
Flynn & Emrich Co.
Morse Boulger, Inc.
Pittsburgh-Des Moines Steel Co.
Plibrico Co.
Pyro Incinerator & Supply Corp.
Sargent Building Specialties Inc.

Suspension Type

Brule Incinerator Corp.
Detrick Co., M. H.
Pittsburgh-Des Moines Steel Co.

INCINERATORS, OFFICE BUILDING

American Incinerator Corp.
(complete selection)
Brule Incinerator Corp.
(confidential)
Brule Incinerator Corp.
(general waste)
Goder Incinerators, Joseph
(destructors)
Goder Incinerators, Joseph
(portable)
Incinerator Products Co.
(direct fed)
Morse Boulger, Inc.
Nash, Cadmus & Voelker, Inc.
Plibrico Co.
(multi-chamber)
Pyro Incinerator & Supply Corp.
(complete selection)
Sargent Building Specialties Inc.
Washburn & Granger, Inc.
(complete selection)

INCINERATORS, WIRE BURNING

American Incinerator Corp.
(individually designed)
Brule Incinerator Corp.
(batch load)
Brule Incinerator Corp.
(continuous feed)
Morse Boulger, Inc.
(special)
Nash, Cadmus & Voelker, Inc.
Plibrico Co.
(multi-chamber)
Pyro Incinerator & Supply Corp.
(dutch oven)
Renneburg & Sons Co., Edward
(front charging)
Sargent Building Specialties Inc.
Summer & Co.
(electrostatic precipitator for burning insulated wire)

INCINERATORS, WOOD WASTE

Multi-Chamber

Plibrico Co.

Silo Types

Allington & Curtis Mfg. Co.
Incinerator Products Co.
Rees Blow Pipe Mfg. Co.

Tepee Types

Koch Sons Inc., George,
Wilco Refuse Burner Div.
Ohio Blow Pipe Co.
Rees Blow Pipe Mfg. Co.

INSTRUMENTS, AIR SAMPLING, TESTING, ANALYSIS

Air Analysis Kits

Compact Air Samplers
Electric Storage Battery Co.,
Willson Products Div.
Ellison Draft Gage Co. Inc.
Epic, Inc.
Gelman Instrument Co.
Hays Corp., The
Joy Mfg. Co.,
Western Precipitation Div.
Mine Safety Appliances Co.
National Spectrographic Laboratories
Union Industrial Equipment Corp.
Will Corp.

Air Pollution Analysis Kits

Cenco Instruments Corp.,
Central Scientific Div.

Analyzer, Carbon Monoxide

Bacharach Industrial Instrument Co.
Beckman Instruments, Inc., Scientific
& Process Instruments Div.
Davis Emergency Equipment Co., Inc.
Ellison Draft Gage Co. Inc.
Epic, Inc.
Gelman Instrument Co.
General Scientific Equipment Co.
Hays Corp., The
Leeds & Northrup Co.
Mine Safety Appliances Co.
Precision Scientific Co.
Union Industrial Equipment Corp.
Will Corp.

Analyzer, Gas, Infrared

Gelman Instrument Co.

Analyzer, Gas, Thermal Conductivity

American Instrument Co. Inc.
Bailey Meter Co.
Baird-Atomic, Inc.
Beard Instruments, Inc.
Beckman Instruments, Inc., Scientific
& Process Instruments Div.
Davis Emergency Equipment Co.,
Inc.
Epic, Inc.
Hastings-Raydist, Inc.
Hays Corp., The
Hogart Engineering Co.
Leeds & Northrup Co.
Mine Safety Appliances Co.
Precision Scientific Co.

Analyzer, Gas, Ultraviolet

Beckman Instruments, Inc., Scientific
& Process Instruments Div.
Epic, Inc.

Analyzer, Nitrogen Dioxide

Mast Development Co. Inc.

Analyzer, Olefins

Mast Development Co. Inc.

Analyzer, Ozone

Epic, Inc.
Mast Development Co. Inc.
Mine Safety Appliances Co.
Precision Scientific Co.

Analyzer, Sulfur Dioxide

Beckman Instruments, Inc., Scientific
& Process Instruments Div.
Consolidated Electrodynamics Corp.
Davis Emergency Equipment Co.,
Inc.
Epic, Inc.
Gelman Instrument Co.
Hays Corp., The
Instrument Development Co.
Leeds & Northrup Co.
Mine Safety Appliances Co.
Precision Scientific Co.
Union Industrial Equipment Corp.

Balancer, Millipore Filter

Cahn Instrument Co.

Bubblers

Gelman Instrument Co.
Hill & Co., E. Vernon
Meriam Instrument Co., The
Mine Safety Appliances Co.
Union Industrial Equipment Corp.

Charts, Ringelman

Mine Safety Appliances Co.

Classifier, Micro-Particle Size

Dietert Co., Harry W.

Colorimeter, Recording

Beckman Instruments, Inc., Scientific
& Process Instruments Div.

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Epic, Inc.
Gelman Instrument Co.

Cyclone, Midget

Aerotec Industries, Inc., Industrial Div.
Union Industrial Equipment Corp.

Densitometer, Paper Tape

Gelman Instrument Co.
Instrument Development Co.
National Spectrographic Laboratories
Research Appliance Co.

Diffractors, X-Ray

Baird-Atomic, Inc.

Filter Holders

Gelman Instrument Co.
Instrument Development Co.
Millipore Filter Corp.
Mine Safety Appliances Co.
Peabody Engineering Corp.
Schmidt Instrument Co.
Union Industrial Equipment Corp.

Filters, Inorganic

Gelman Instrument Co.
Mine Safety Appliances Co.
Rockwell Standard Corp., Air-Maze Div.

Filters, Molecular Sieve

Gelman Instrument Co.
Millipore Filter Corp.
Mine Safety Appliances Co.

Filters, Organic

Gelman Instrument Co.
Microtron Corp.
Millipore Filter Corp.
Mine Safety Appliances Co.
National Spectrographic Laboratories

Flowmeter

Bailey Meter Co.
Brooks Instrument Co. Inc.
Cenco Instruments Corp., Central Scientific Div.
Dwyer Mfg. Co., F. W.
Eclipse Fuel Engineering Co.
Ellison Draft Gage Co. Inc.
Fischer & Porter Co.
Flow Corp.
Foxboro Co., The
Gelman Instrument Co.
Hagan Chemicals & Controls
Hastings-Raydist, Inc.
Hays Corp., The
Meriam Instrument Co., The
National Instrument Laboratories
National Spectrographic Laboratories
Schmidt Instrument Co.
Schutte & Koerting Co.
Wallace & Tiernan Inc.

Impactors, Cascade

American Instrument Co., Inc.
Andersen Samplers & Consulting Service
Mine Safety Appliances Co.
Union Industrial Equipment Corp.

Impinger, Fine Fiber

Electric Storage Battery Co., Willson Products Div.
Gelman Instrument Co.

Impinger, Midget

Compact Air Samplers
Gelman Instrument Co.
Millipore Filter Corp.
Mine Safety Appliances Co.
Research Appliance Co.
Union Industrial Equipment Corp.

Impinger, Single-Jet

Gelman Instrument Co.
Mine Safety Appliances Co.
Union Industrial Equipment Corp.

Impinger, Smith-Greenbert

Mine Safety Appliances Co.

Indicators, Barometric Pressure

Epic, Inc.
Hill & Co., E. Vernon
Kahl Scientific Instrument Corp.
Meriam Instrument Co., The
Science Associates, Inc.
Taylor Instrument Co.
Wallace & Tiernan Inc.

Indicators, Carbon Monoxide

United States Safety Service Co.

Indicators, Remote, Wind Velocity and Direction

Beckman & Whitley, Inc.
Dwyer Mfg. Co., F. W.
Epic, Inc.
Gelman Instrument Co.
Hastings-Raydist, Inc.
Kahl Scientific Instrument Corp.
Rett Electronics, Inc.
Science Associates, Inc.
Taylor Instrument Co.
Trerice Co., H. O.

Indicators, Temperature

American Machine & Metals Inc., United States Gauge Div.
Bacharach Industrial Instrument Co.
Bailey Meter Co.
Barber-Colman Co.
Colorado Oil & Gas Corp., Marsh Instrument Div.
Dillon & Co., Inc., W. C.
Epic, Inc.
Fischer & Porter Co.
Foxboro Co., The
Gelman Instrument Co.
Hagan Chemicals & Controls
Hays Corp., The
Hill & Co., E. Vernon
Johnson Service Co.
Kahl Scientific Instrument Corp.
Leeds & Northrup Co.
Partlow Corp., The
Pyrometer Service Co., Inc.
Simpson Electric Co.
Taylor Instrument Co.
Trerice Co., H. O.
Weksler Instruments Corp.
West Instrument Corp.

Isokinetic Dust Sampler

Antipol Corp.

Manometers

Bacharach Industrial Instrument Co.
Consolidated Electrodynamics Corp.
Dwyer Mfg. Co., F. W.
Eclipse Fuel Engineering Co.
Ellison Draft Gage Co. Inc.
Fischer & Porter Co.
General Scientific Equipment Co.
Hill & Co., E. Vernon
King Engineering Corp.
Meriam Instrument Co., The
Precision Scientific Co.
Trerice Co., H. O.
Wallace & Tiernan Inc.

Meters, Dry Gas

Foxboro Co., The
Gelman Instrument Co.
Hays Corp., The
Research-Cottrell Inc.

Meters, Wet Test

Foxboro Co., The
Precision Scientific Co.

Micromanometers

Consolidated Electrodynamics Corp.
Dwyer Mfg. Co., F. W.
Flow Corp.
Gelman Instrument Co.
Hill & Co., E. Vernon
Meriam Instrument Co., The
National Instrument Laboratories
Precision Scientific Co.
Rett Electronics, Inc.

Microscope, Slit

Brinkmann Instruments, Inc.

Monitors, Air, Radioactive

Nuclear Measurements Corp.

Orifice, Flowmeters

American Machine & Metals Inc., United States Gauge Div.
Bailey Meter Co.
Ellison Draft Gage Co. Inc.
Fischer & Porter Co.
Foxboro Co., The
Gelman Instrument Co.
Hagan Chemicals & Controls
Hastings-Raydist, Inc.
Hays Corp., The
King Engineering Corp.
Meriam Instrument Co., The
Millipore Filter Corp.
Research Appliance Co.
Schutte & Koerting Co.
Taylor Instrument Co.
Union Industrial Equipment Corp.

Particle Counters, Electrical Resistance Change

Coulter Industrial Sales Co.

Particle Counters, Photoelectric

Cooke, Troughton & Simms, Ltd.
De-Tec-Tronic Corp.
Frommer Co., Joseph C.
Gelman Instrument Co.
National Spectrographic Laboratories

Royco Instruments, Inc.
Union Industrial Equipment Corp.

Pitot Tubes

Buell Engineering Co., Inc.
Dwyer Mfg. Co., F. W.
Ellison Draft Gage Co. Inc.
Epic, Inc.
Foxboro Co., The
Hill & Co., E. Vernon
Joy Mfg. Co.,
Western Precipitation Div.
Meriam Instrument Co., The
Research-Cottrell Inc.

Pitot Venturi Elements

Hays Corp., The
Taylor Instrument Co.

Polarographs

Brinkmann Instruments, Inc.
Leeds & Northrup Co.

Precipitator, Thermal

American Instrument Co., Inc.
Mine Safety Appliances Co.

Recorder, Barometric Pressure

Amprobe Instrument Corp.
Bacharach Industrial Instrument Co.
Belfort Instrument Co.
Epic, Inc.
General Scientific Equipment Co.
Hays Corp., The
Hill & Co., E. Vernon
Kahl Scientific Instrument Corp.
Leeds & Northrup Co.
Science Associates, Inc.
Taylor Instrument Co.
Trerice Co., H. O.

Recorder, Humidity

Science Associates, Inc.

Recorder, Rainfall

Science Associates, Inc.

Recorder, Smoke

Photomation, Inc.

Recorder, Temperature

American Machine & Metals Inc.,
United States Gauge Div.
Amprobe Instrument Corp.
Bacharach Industrial Instrument Co.
Bailey Meter Co.
Barber-Colman Co.
Belfort Instrument Co.
Epic, Inc.
Fischer & Porter Co.
Foxboro Co., The
General Scientific Equipment Co.
Hagan Chemicals & Controls
Hays Corp., The
Hill & Co., E. Vernon
Johnson Service Co.
Kahl Scientific Instrument Corp.
Leeds & Northrup Co.
Partlow Corp., The
Pyrometer Service Co., Inc.
Science Associates, Inc.
Taylor Instrument Co.
Trerice Co., H. O.
Weksler Instruments Corp.
West Instrument Corp.

Recorder, Wind Velocity and Direction

Beckman & Whitley, Inc.
Belfort Instrument Co.
Epic, Inc.
Gelman Instrument Co.
General Scientific Equipment Co.
Hastings-Raydist, Inc.
Hays Corp., The
Instrument Development Co.
Kahl Scientific Instrument Corp.
Leeds & Northrup Co.
Rett Electronics, Inc.
Science Associates, Inc.

Rotometers

Fischer & Porter Co.
Gelman Instrument Co.
Schutte & Koerting Co.
Wallace & Tiernan Inc.

Samplers, Absorbers

Compact Air Samplers
Gelman Instrument Co.
Mine Safety Appliances Co.

Samplers, Air, Electrostatic

Brinkmann Instruments, Inc.
Kahl Scientific Instrument Corp.
Mine Safety Appliances Co.
Union Industrial Equipment Corp.

Samplers, Air, High Volume

Aerotec Industries, Inc.,
Industrial Div.
Gelman Instrument Co.
Millipore Filter Corp.
Mine Safety Appliances Co.
National Spectrographic Laboratories
Schmidt Instrument Co.
Staplex Co., The,
Air Sampler Div.
Union Industrial Equipment Corp.

Samplers, Air, Low Volume

American Instrument Co., Inc.
Breslove Separator Co.
Compact Air Samplers
Gelman Instrument Co.
Instrument Development Co.
Millipore Filter Corp.
Mine Safety Appliances Co.
National Spectrographic Laboratories
Research Appliance Co.
Rett Electronics, Inc.
Schmidt Instrument Co.
Staplex Co., The, Air Sampler Div.
Union Industrial Equipment Corp.
Von Brand Filtering Recorders

Samplers, Air, Paper Tape, Sequential

Compact Air Samplers
Gelman Instrument Co.
Instrument Development Co.
National Spectrographic Laboratories
Research Appliance Co.
Union Industrial Equipment Corp.
Von Brand Filtering Recorders

Samplers, Dust-Using Thermal Precipitation

Ficklen Co., Joseph B.

Samplers, Smoke, Automatic

Gelman Instrument Co.
General Scientific Equipment Co.
Hays Corp., The
Instrument Development Co.
Mine Safety Appliances Co.
Monitron Co., The
Research Appliance Co.
Von Brand Filtering Recorders
Worner Electronic Devices

Sedimentation Collectors

Brinkmann Instruments, Inc.

Spectrometers, Infrared

American Instrument Co., Inc.
Baird-Atomic, Inc.
Beckman Instruments, Inc., Scientific & Process Instruments Div.
Mine Safety Appliances Co.

Spectrometers, Mass

Baird-Atomic, Inc.
Consolidated Electrodynamics Corp.

Spectrophotometers

Baird-Atomic, Inc.

Sulfur Dioxide Recorders and Monitors

Consolidated Electrodynamics Corp.
Davis Emergency Equipment Co., Inc.
Gelman Instrument Co.
Hays Corp., The
Instrument Development Co.
Leeds & Northrup Co.
Mine Safety Appliances Co.
Union Industrial Equipment Corp.

Thermo-Anemometer

Electric Storage Battery Co.,
Willson Products Div.

Viewers, Smoke, Remote

Photomation, Inc.

ODOR REMOVAL EQUIPMENT

Airkem, Inc.
Morris Deodorizers, Inc.,
Electronics Div.
Rhodia Inc.

PRECIPITATORS, ELECTROSTATIC

Dry Pipe Type

Aerotec Industries, Inc.,
Industrial Div.

(Please turn to following page)

(Continued from preceding page)

Buell Engineering Co., Inc.
Joy Mfg. Co.,
Western Precipitation Div.
Koppers Co., Inc.,
Metal Products Div.
Research-Cottrell Inc.
Wood Co., John,
Air Pollution Control Div.

Dry Plate Type, Horizontal Flow

Aerotec Industries, Inc.,
Industrial Div.
American Air Filter Co., Inc.
Buell Engineering Co., Inc.
Joy Mfg. Co.,
Western Precipitation Div.
Koppers Co., Inc.,
Metal Products Div.
Morris Deodorizers, Inc.,
Electronics Div.
Radex Corp.
Research-Cottrell Inc.
Trion, Inc.
Wood Co., John,
Air Pollution Control Div.

Dry Plate Type, Vertical Flow

Buell Engineering Co., Inc.
Joy Mfg. Co.,
Western Precipitation Div.
Koppers Co., Inc.,
Metal Products Div.
Morris Deodorizers, Inc.,
Electronics Div.
Radex Corp.
Research-Cottrell Inc.
Trion, Inc.
Wood Co., John,
Air Pollution Control Div.

Wet Pipe Type

Aerotec Industries, Inc.,
Industrial Div.
Buell Engineering Co., Inc.
Joy Mfg. Co.,
Western Precipitation Div.
Koppers Co., Inc.,
Metal Products Div.
Research-Cottrell Inc.
Summer & Co.
Wood Co., John,
Air Pollution Control Div.

Wet Plate Type

Buell Engineering Co., Inc.
Joy Mfg. Co.,
Western Precipitation Div.
Koppers Co., Inc.,
Metal Products Div.
Research-Cottrell Inc.
Wood Co., John,
Air Pollution Control Div.

SILICA GEL ABSORBERS

Criswell Co., Inc., W. W.
(absorbing pad for electronic equipment)
Dryomatic Corp.
(dehydrators dehumidifiers, moisture filters)
Wheelabrator Corp.
(dry with appropriate additives)

SOLVENT RECOVERY SYSTEMS

Automotive Rubber Co., Inc.,
Process Equipment Div.
(direct contact condenser type packed tower)
Barnebey-Cheney Co.
(activated charcoal vapor recovery system)
Branson Instruments Inc.
(recovers chlorinated solvents)
Gelman Instrument Co.
(liquid pressure filtration equipment)
Gelman Instrument Co.
(solvent resistant polypore membrane filters)
Wheelabrator Corp.
(dry with appropriate additives)

STACKS AND CHIMNEYS

Aerotec Industries, Inc.,
Industrial Div.
(combined I.D. fan)
Aerotec Industries, Inc.,
Industrial Div.
(I.D. & F.D. fans)
American Incinerator Corp.
(hi-temp, refractory lined, steel)
Argo Plastic Products Co.
(all plastic for corrosive conditions)
Automotive Rubber Co., Inc.,
Process Equipment Div.
(steel or rubber lined steel)
Beetle Plastics Corp., Carl N.
(chemical exhaust)
Ceilcote Co., Inc., The
(reinforced plastic)
Fly Ash Arrestor Corp., The
(evase and straight)
Heil Process Equipment Corp.
(corrosion proof, rubber lined and coated steel)
Incinerator Products Co.
(steel, refractory lined, pre-fab)
Industrial Plastic Fabricators, Inc.
(PVC)
Joy Mfg. Co.,
Western Precipitation Div.
(large industrial)
Knight Co., Maurice A.
(acid resisting ducts)
Nash, Cadmus & Voelker, Inc.
(steel, firebrick lined)
Nash, Cadmus & Voelker, Inc.
(steel, unlined)
Ohio Blow Pipe Co.
(steel or alloy up to ¼ in. plate)
Pittsburgh-Des Moines Steel Co.
(steel, guyed & self supporting)
Plibrico Co.
(refractory-lined steel)
Pyro Incinerator & Supply Corp.
(refractory lined steel cased)
Quelcor, Inc.
(vinyl, plastisol coated)
St. Louis Blow Pipe Co.
(steel)
Smith Corp., A. O.
(glass, protected inside & outside)

TOWERS

Vapor Condensing

Renneburg & Sons Co., Edward

ALPHABETICAL LIST OF MANUFACTURERS OF GAS CLEANING EQUIPMENT

A

Aerodyne Development Corp.
12727 Buckeye Rd.
Cleveland, Ohio

Aerotec Industries, Inc.
Industrial Div.
Greenwich, Conn.

Aget Mfg. Co.
1341 E. Church St.
Adrian, Mich.

Air Conditioning Engineering Co.
44 First St.
Cambridge 41, Mass.

Air Filter Corp.
4554 W. Woolworth Ave.
Milwaukee 18, Wis.

Air & Refrigeration Corp.
439 Madison Ave.
New York 22, N. Y.

Airgard Mfg. Co.
362 W. Erie St.
Chicago 10, Ill.

Airkem, Inc.
241 E. 44th St.
New York 17, N. Y.

Aladdin Heating Corp.
1111 Aladdin Ave.
San Leandro, Calif.

Allington & Curtis Mfg. Co.
945 Towerline Rd.
Saginaw, Mich.

American Air Filter Co., Inc.
215 Central Ave.
Louisville, Ky.

American Blow Pipe Co., Inc.
3549 W. Cermak Rd.
Chicago 23, Ill.

American Felt Co.
101 Glenville Rd.
Glenville, Conn.

American Incinerator Corp.
2710 E. Nevada
Detroit 34, Mich.

American Instrument Co., Inc.
8030 Georgia Ave.
Silver Spring, Md.

American Machine & Metals, Inc.
United States Gauge Div.
Sellersville, Pa.

American-Standard
Industrial Div.
8111 Tireman Ave.
Detroit 32, Mich.

Amprobe Instrument Corp.
630 Merrick Rd.
Lynbrook, N. Y.

Anderson Samplers & Consulting Service
1074 Ash Ave.
Provo, Utah

Antipol Corp.
407 Hill Arcade
Galesburg, Ill.

Arco Mfg. Corp.
542 W. 55th St.
New York 19, N. Y.

Argo Plastic Products Co.
1400 W. Tenth St.
Cleveland 13, Ohio

Associated Mills, Inc.
307 W. Monroe St.
Chicago 6, Ill.

Automotive Rubber Co., Inc.
Process Equipment Div.
12550 Beech Rd.
Detroit 39, Mich.

B

Bacharach Industrial Instrument Co.
200 N. Braddock Ave.
Pittsburgh 8, Pa.

Bahnson Co., The
1001 S. Marshall St.
Winston-Salem, N. C.

Bailey Meter Co.
1050 Ivanhoe Rd.
Cleveland 10, Ohio

Baird-Atomic, Inc.
33 University Rd.
Cambridge 38, Mass.

Barber-Colman Co.
Drawer 99
Rockford, Ill.

Barnebey-Cheney Co.
Cassady at Eighth
Columbus 19, Ohio

Barry Blower Co.
3100 California St., N.E.
Minneapolis 18, Minn.

Bartlett-Snow-Pacific, Inc.
6200 Harvard Ave.
Cleveland 5, Ohio

Beard Instruments, Inc.
3963 Kirby Dr.
Houston 6, Texas

Beckman Instruments, Inc.
Scientific & Process Instruments Div.
2500 Harbor Blvd.
Fullerton, Calif.

Beckman & Whitney, Inc.
993 E. San Carlos Ave.
San Carlos, Calif.

Beetle Plastics Corp., Carl N.
198 Airport Rd.
Fall River, Mass.

Belfort Instrument Co.
4 N. Central Ave.
Baltimore 2, Md.

Bemis Brother Bag Co.
111 N. Fourth St.
P. O. Box 102
St. Louis 2, Mo.

Blower Application Co.
3361 N. 35th St.
Milwaukee 16, Wis.

Branson Instruments, Inc.
37 Brown House Rd.
Stamford, Conn.

Breslove Separator Co.
406 Commonwealth Bldg.
Pittsburgh 22, Pa.

Breuer Electric Mfg. Co.
5100 N. Ravenswood Ave.
Chicago 40, Ill.

Brinkmann Instruments, Inc.
115 Cutter Mill Rd.
Great Neck, N. Y.

Bristol Sheet Metal Co.
7 Carlton
Wallingford, Conn.

Brooks Instrument Co., Inc.
407 W. Vine St.
Hatfield, Pa.

Brule Incinerator Corp.
13920 S. Western
Blue Island, Ill.

Buell Engineering Co., Inc.
123 William St.
New York 38, N. Y.

Buell Engineering Co., Inc.
Northern Blower Div.
6409 Barberton Ave.
Cleveland, Ohio

Buffalo Forge Co.
490 Broadway
Buffalo 5, N. Y.

C

Cahn Instrument Co.
14511 Paramount Blvd.
Paramount, Calif.

Cambridge Filter Corp.
744 E. Erie Blvd.
Syracuse 1, N. Y.

Canton Stoker Corp.
300 Andrew Pl., S.W.
Canton 1, Ohio

Carey Electronic Engineering Co.
1880 Clifton Ave.
Springfield, Ohio

Carolina Blower Co., Inc.
428-436 Morehead Ave.
Greensboro, N. C.

Carpart Corp.
209 W. Exchange St.
Owosso, Mich.

Carrier Air Conditioning Co.
Carrir Parkway
Syracuse, N. Y.

Catalytic Combustion Corp.
4725 Fourteenth
Detroit 8, Mich.

Ceilcote Co., Inc., The
4832 Ridge Rd.
Cleveland 9, Ohio

Cenco Instruments Corp.
Central Scientific Div.
1700 Irving Park Rd.
Chicago 13, Ill.

Central Vacuum Corp.
3008 E. Olympic Blvd.
Los Angeles 23, Calif.

Centri-Spray Corp.
39001 Schoolcraft Rd.
Livonia, Mich.

Chemical Construction Corp.
320 Park Ave.
New York 22, N. Y.

Chicago Air Filter Co.
4125 W. Washington Blvd.
Hillside, Ill.

Chicago Blower Corp.
9867 Pacific Ave.
Franklin Park, Ill.

Cincinnati Electrical Tool Co.
300-314 Mt. Hope Ave.
Cincinnati 3, Ohio

Cincinnati Fan & Ventilator Co.
6516 Wiehe Rd.
Cincinnati 37, Ohio

Clarage Fan Co.
1 Clarage Pl.
Kalamazoo, Mich.

Clements Mfg. Co.
6650 S. Narragansett Ave.
Chicago 38, Ill.

Coast Mfg. & Supply Co.
P. O. Box 71
Livermore, Calif.

Colorado Oil & Gas Corp.
Marsh Instrument Div.
3501 Howard St.
Skokie, Ill.

Commercial Filters Corp.
2 Main St.
Melrose 76, Mass.

Compact Air Samplers
825 Belmonte Park, N.
Dayton 5, Ohio

Connor Engineering Corp.
Shelter Rock Lane
Danbury, Conn.

Consolidated Electrodynamics Corp.
360 Sierra Madre Villa
Pasadena, Calif.

Continental Air Filters, Inc.
P. O. Box 1647
Louisville 1, Ky.

Cooke, Troughton & Simms, Ltd.
91 Waite St.
Malden 48, Mass.

Coulter Industrial Sales Co.
2525 N. Sheffield Ave.
Chicago 14, Ill.

Criswell Co., Inc., W. W.
800 Industrial Hwy.
P. O. Box 187
Riverton, N. J.

D

Davis Emergency Equipment Co., Inc.
Davis Instruments Div.
47 Halleck St.
Newark 4, N. J.

Day Co., The
810 Third Ave., N.E.
Minneapolis 13, Minn.

De-Tec-Tronic Corp.
2512 N. Halsted St.
Chicago 14, Ill.

Detrick Co., M. H.
111 W. Washington St.
Chicago 2, Ill.

DeVilbiss Co., The
Metal Fabricators Div.
5741 Russell St.
Detroit 11, Mich.

Dietert Co., Harry W.
9330 Roselawn Ave.
Detroit 4, Mich.

Dillon & Co.,Inc., W. C.
14620 Keswick St.
Van Nuys, Calif.

Dravo Corp.
Neville Island
Pittsburgh 25, Pa.

Drico Industrial Corp.
100 Eighth St.
Passaic, N. J.

Dryomatic Corp.
715 N. Fayette St.
Alexandria, Va.

Ducon Co., Inc., The
135 E. Second St.
Mineola, N. Y.

Dust Control Co.
1200 Brookpark Rd.
Cleveland 9, Ohio

Dust Suppression & Engineering Co.
P. O. Box 67
Lake Orien, Mich.

DustEnder Co.
3500 Pontiac Rd.
Ann Arbor, Mich.

Dustex Corp.
25 Anderson Rd.
Buffalo 25, N. Y.

Dwyer Mfg. Co., F. W.
P. O. Box 373
Michigan City, Ind.

E

Eclipse Fuel Engineering Co.
1100 Buchanan St.
Rockford, Ill.

Electric Storage Battery Co.
Willson Products Div.
2nd & Wash. Sts.
Reading, Pa.

Ellison Draft Gage Co., Inc.
548 W. Monroe St.
Chicago 6, Ill.

Empire Blower Co., Inc.
58-60 Lenriet St.
Rochester 15, N. Y.

Epic, Inc.
150 Nassau St.
New York 38, N. Y.

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(Continued from preceding page)

F

Fabric Specialties, Inc.
1362 W. Sixth St.
Cleveland 13, Ohio

Farr Co.
2301 Rosecrans Ave.
El Segundo, Calif.

Ficklen Co., Joseph B.
1848 E. Mountain St.
Pasadena, Calif.

Fischer & Porter Co.
Jacksonville Rd.
Warminster, Pa.

Flanders Filters
P. O. Box 718
Riverhead, N. Y.

Flexaust Co., The
100 Park Ave.
New York 17, N. Y.

Flexible Tubing Corp.
Guilford, Conn.

Flow Corp.
11 Carleton St.
Cambridge 42, Mass.

Fly Ash Arrestor Corp., The
271 N. First St.
Birmingham, Ala.

Flynn & Emrich Co.
301 Holliday St.
Baltimore 2, Md.

Foxboro Co., The
Foxboro, Mass.

Frigid Inc.
1250 Rockaway Ave.
Brooklyn 36, N. Y.

Frommer Co., Joseph C.
1525 Teakwood Ave.
Cincinnati 24, Ohio

Fuller Co.
Dracco Div.
4063 E. 116th St.
Cleveland 5, Ohio

G

Gelman Instrument Co.
P. O. Box 118-E
Chelsea, Mich.

General Blower Co.
8603 Ferris Ave.
Morton Grove, Ill.

General Scientific Equipment Co.
Limekiln Pike & Williams Ave.
Philadelphia 50, Pa.

Gerwin Electronics, Inc.
7-22 149th St.
Whitestone 57, N. Y.

Goder Incinerators, Joseph
4241 N. Honore St.
Chicago 13, Ill.

Green Fuel Economizer Co., Inc., The
627 Main St.
Beacon, N. Y.

Griffin Industries, Inc.
500 Bergman Ave.
Louisville, Ky.

Gustin-Bacon Mfg. Co.
210 W. 10th St.
Kansas City 5, Mo.

H

Hagan Chemicals & Controls
P. O. Box 1346
Pittsburgh 30, Pa.

Hald Pneumatic Systems
84 Oak St.
Brooklyn 22, N. Y.

Hastings-Raydist, Inc.
Newcomb Ave.
Hampton, Va.

Haveg Corp.
900 Greenbank Rd.
Wilmington 8, Dela.

Hays Corp., The
742 E. Eighth St.
Michigan City, Ind.

Heil Process Equipment Corp.
12901 Elmwood Ave.
Cleveland 11, Ohio

Herrick Co., George S.
110 Liberty St.
Syracuse, N. Y.

Hill & Co., E. Vernon
P. O. Box 189
Lake Geneva, Wis.

Hoffman Industries, Inc.
103 Fourth Ave.
New York 3, N. Y.

Hogart Engineering Co.
1050 S. Olive St.
Los Angeles 15, Calif.

I

Incinerator Products Co.
655 S. Post
Detroit 17, Mich.

Industrial Plastic Fabricators, Inc.
Endicott St.
Norwood, Mass.

Industrial Sheet Metal Works
4025 Bergen Turnpike
N. Bergen, N. J.

Instrument Development Co.
3231 Kansas Ave.
Riverside, Calif.

J

Johnson-March Corp., The
3018 Market St.
Philadelphia 4, Pa.

Johnson Service Co.
507 E. Michigan St.
Milwaukee 1, Wis.

Joy Mfg. Co.
Western Precipitation Div.
1000 W. Ninth St.
Los Angeles 54, Calif.

K

Kahl Scientific Instrument Corp.
737 W. Main
El Cajon, Calif.

Kice Metal Products Co.
2040 S. Mead Ave.
Wichita 11, Kan.

King Engineering Corp.
3242 S. State St.
Ann Arbor, Mich.

Kirk & Blum Mfg. Co., The
3120 Forrer St.
Cincinnati 9, Ohio

Kleissler Co., G. A.
126 Gotthart St.
Newark 5, N. J.

Knight Co., Maurice A.
171 Kelly Ave.
Akron, Ohio

Koch Sons Inc., George
Wilco Refuse Burner Div.
Municipal Airport
Memphis 14, Tenn.

Koppers Co., Inc.
Engineering and Construction Div.
Koppers Bldg.
Pittsburgh 19, Pa.

Koppers Co., Inc.
Metal Products Div.
200 Scott St.
Baltimore 3, Md.

L

Leeds & Northrup Co.
4907 Stenton Ave.
Philadelphia 44, Pa.

M

MacLeod Co., The
11755 Mosteller Rd.
Cincinnati 41, Ohio

Mahon Co., The R. C.
6565 E. 8 Mile Rd.
Detroit 34, Mich.

Majac, Inc.
23rd St. & PRR
Sharpsburg, Pittsburgh 15, Pa.

Marlo Coils Co.
7100 S. Grand Ave.
St. Louis 11, Mo.

Mast Development Co., Inc.
2212 E. Twelfth St.
Davenport, Iowa

Master Fan Corp.
1323 Channing St.
Los Angeles 21, Calif.

Menardi & Co.
1222 E. Grand Ave.
El Segundo, Calif.

Meriam Instrument Co., The
10920 Madison Ave.
Cleveland 2, Ohio

Microtron Corp.
2136 S. Blvd.
P. O. Box 2092
Charlotte 1, N. C.

Millipore Filter Corp.
Bedford, Mass.

Mine Safety Appliances Co.
201 N. Braddock Ave.
Pittsburgh 8, Pa.

Minneapolis-Honeywell Regulator Co.
2747 Fourth Ave., S.
Minneapolis 8, Minn.

Modern Dust Bag Co., Inc.
132 E. Railroad Ave.
W. Haverstraw, N. Y.

Monitron Co., The
1815 Wilaray Terrace
Cincinnati 30, Ohio

Morris Deodorizers, Inc.
Electronics Div.
2819 Broadway, N.E.
Knoxville 17, Tenn.

Morse Boulger, Inc.
80 Fifth Ave.
New York 11, N. Y.

N

Nash, Cadmus & Voelker, Inc.
45 W. 45th St.
New York 36, N. Y.

National Dust Collector Corp.
549 W. Washington Blvd.
Chicago 6, Ill.

National Filter Media Corp.
1717 Dixwell Ave.
New Haven, Conn.

National Instrument Laboratories
828 Evarts St., N.E.
Washington, D. C.

National Spectrographic Laboratories
6300 Euclid Ave.
Cleveland, Ohio

Nuclear Measurements Corp.
2460 N. Arlington Ave.
Indianapolis 18, Ind.

O

Ohio Blow Pipe Co.
1727 Doan Ave.
Cleveland 12, Ohio

Owens-Corning Fiberglas Corp.
717 Fifth Ave.
New York 22, N. Y.

Oxy-Catalyst, Inc.
511 Old Lancaster Rd.
Berwyn, Pa.

P

Pangborn Corp.
910 Pangborn Blvd.
Hagerstown, Md.

Partlow Corp., The
261 Campion Rd.
New Hartford (Utica), N. Y.

Peabody Engineering Corp.
232 Madison Ave.
New York 16, N. Y.

Penberthy Mfg. Co.
2660 E. Grand Blvd.
Detroit 11, Mich.

Permatron Corp.
666 E. Kensington Rd.
Arlington Heights, Ill.

Photomation, Inc.
280 Polaris Ave.
Sunnyvale, Calif.

Pittsburgh-Des Moines Steel Co.
Grand Ave., Neville Island
Pittsburgh 25, Pa.

Plibrico Co.
1800 N. Kingsbury St.
Chicago 14, Ill.

Porter Co., Inc., H. K.
Peerless Electric Div.
1401 W. Market St.
Warren, Ohio.

Porter Co., Inc., H. K.
Thermoid Div.
201 N. Allen St.
Chanute, Kans.

Precision Scientific Co.
3737 W. Cortland
Chicago 47, Ill.

Puhl & Hepper Mfg. Co., Inc.
6400 W. Florissant
St. Louis 20, Mo.

Pulverizing Machinery Co.
Chatham Rd.
Summit, N. J.

Pyro Incinerator & Supply Corp.
38 Windsor Ave.
Mineola, L. I., N. Y.

Pyrometer Service Co., Inc.
348 River Rd.
N. Arlington, N. J.

Q

Quelcor, Inc.
Front & Broomall Sts.
Chester, Pa.

R

Radex Corp.
2076 Elston Ave.
Chicago 14, Ill.

Rees Blow Pipe Mfg. Co.
2929 Fifth St.
Berkeley 10, Calif.

Renneburg & Sons Co., Edward
2939 Boston St.
Baltimore 24, Md.

Repco, Inc.
840 Fifth Ave.
Brooklyn 32, N. Y.

Research Appliance Co.
Route 8 at Craighead Rd.
Allison Park, Pa.

Research-Cottrell, Inc.
P. O. Box 750
Bound Brook, N. J.

Research Products Corp.
1015 E. Washington Ave.
Madison 1, Wis.

Rett Electronics, Inc.
21535 Groesbeck Hwy.
Warren, Mich.

Rhodia, Inc.
60 E. 56th St.
New York 22, N. Y.

Robbins & Myers, Inc.
Springfield, Ohio.

Rockwell Standard Corp.
Air-Maze Div.
25000 Miles Rd.
Cleveland 28, Ohio

Royco Instruments, Inc.
440 Olive St.
Palo Alto, Calif.

Ruemelin Mfg. Co.
3846 N. Palmer St.
Milwaukee 12, Wis.

S

St. Louis Blow Pipe Co.
1948 N. Ninth St.
St. Louis 6, Mo.

Sargent Building Specialties, Inc.
610 Devon St.
Kearny, N. J.

Schmidt Instrument Co.
P. O. Box 111
San Carlos, Calif.

Schmieg Industries, Inc.
23930 Sherwood Ave.
Center Line, Mich.

Schneible Co., Claude B.
P. O. Box 296
Roosevelt Pk. Annex
Detroit 32, Mich.

Schutte & Koerting Co.
Cornwells Heights
Bucks Co., Pa.

Schutz-O'Neill Co.
307 Portland Ave.
Minneapolis 15, Minn.

Science Associates, Inc.
P. O. Box 216
194 Nassau St.
Princeton, N. J.

Seco, Inc.
110 East St.
Goodlettsville, Tenn.

Simpson Electric Co.
5200 W. Kinzie St.
Chicago 44, Ill.

Skuttle Mfg. Co.
140 W. Summit
Milford, Mich.

Sly Mfg. Co., W. W.
4700 Train Ave.
Cleveland 1, Ohio

Small Motors Inc.
2076 Elston Ave.
Chicago 14, Ill.

Smith Corp., A. O.
3533 N. 27th St.
Milwaukee 16, Wis.

Snow Filtration Co.
129 W. 4th St.
Cincinnati 2, Ohio

Sprout, Waldron & Co., Inc.
Muncy, Pa.

Standard Electric Mfg. Co., Inc.
Haddon Ave.
West Berlin, N. J.

Staplex Co., The
Air Sampler Div.
777 Fifth Ave.
Brooklyn 32, N. Y.

Sterling Blower Co.
791 Windsor St.
Hartford, Conn.

Stevens & Co., Inc., J. P.
Stevens Building
Broadway at 41st St.
New York 36, N. Y.

Summer & Co.
555 Buttles Ave.
Columbus, Ohio

T

Taylor Instrument Co.
95 Ames St.
Rochester 1, N. Y.

Technical Fabricators, Inc.
136 Washington Ave.
Nutley, N. J.

Technical Filter Co.
2719 S. Poplar Ave.
Chicago 8, Ill.

Torit Mfg. Co.
1133 Rankin St.
St. Paul 16, Minn.

Travis Mills Corp.
1071 Sixth Ave.
New York, N. Y.

Trerice Co., H. O.
1420 W. Lafayette Blvd.
Detroit 16, Mich.

Trion, Inc.
1000 Island Ave.
McKees Rocks, Pa.

U

Union Carbide Development Co.
270 Park Ave.
New York 17, N. Y.

Union Industrial Equipment Corp.
40 Beech St.
Port Chester, N. Y.

Union Tank Car Co.
Graver Water Conditioning Div.
216 W. 14th St.
New York 11, N. Y.

Union Sheet Metal Co., Inc.
883 N. Cassady Ave.
Columbus, Ohio

United States Safety Service Co.
1535 Walnut St.
Kansas City, Mo.

United States Stoneware Co., The
12 East Ave.
Tallmadge, Ohio

Universal Dynamics Corp.
4200 Wheeler Ave.
Alexandria, Va.

V

Vaculator Co., Inc.
49-55 Liberty St.
Newark 2, N. J.

Von Brand Filtering Recorders
Knapp Rd.
Hopewell Junction, N. Y.

Vortox Co.
121 S. Indian Hill Blvd.
Claremont, Calif.

W

Wagner Awning & Mfg. Co., The
2658 Scranton Rd.
Cleveland, Ohio

Wallace & Tiernan, Inc.
25 Main St.
Belleville 9, N. J.

Washburn & Granger, Inc.
85 Fifth Ave.
Paterson 4, N. J.

Weksler Instruments Corp.
195 E. Merrick Rd.
Freeport, L. I., N. Y.

Wellington Sears Co., Inc.
111 W. 40th St.
New York 18, N. Y.

West Instrument Corp.
4363 W. Montrose Ave.
Chicago 41, Ill.

Western Blower Co.
1800 S. Airport Way
Seattle 4, Wash.

Westinghouse Electric Corp.
Sturtevant Div.
Hyde Park, Boston 36, Mass.

Wheelabrator Corp.
1500 S. Byrkit St.
Mishawaka, Ind.

Will Corp.
39 Russell St.
Rochester 7, N. Y.

Wood Co., John
Air Pollution Control Div.
Nicolet Ave.
Florham Park, N. J.

Worner Electronic Devices
121 N. Main St.
Rankin, Ill.

New Literature

Hydronic Zone Valves

Literature Units R-1698, R-1709 and R-37-0940 cover White-Rodgers Company new line of heavy-duty, "no-stick" motorized globe valves for zone control of steam or hot water systems, or for flow control of oil or air; control of liquid levels; maintenance of desired pressure conditions; automatic control of a complete process on a time or program basis. Models up to 150 psi, ½" to 3".

Circle #71 on page 55.

Central Air Conditioners

Catalog 560 issued by McQuay, Inc., manufacturer of heating, air conditioning and refrigeration equipment, completely describes and illustrates their Seasonmaster central air conditioning line.

In addition to general and mechanical design features, Catalog 560 offers detailed, step by step information to assist in selection of unit type and size, cooling and heating coil selection, accessories and determination of fan speed and motor hp requirements.

Other complete charts and tables on selection and dimensional data are also presented for easy selection.

Circle #72 on page 55.

Infrared Heat

Electric Infrared Radiant Heat —what it is—is explained in a new 4-page, 2-color brochure containing application illustration—both indoors and out.

The brochure points up desirable factors of Electric Infrared Radiant Heat: low equipment installation, maintenance and operating cost—instantaneous—silent—clean —healthy—and completely SAFE.

Circle #73 on page 55.

Bin Vent Pulsaire

For maximum dust collection efficiency and operating economy with pneumatic conveyer-receivers, a new Mikro-Pulsaire Bin Vent is described in Bulletin 52C. Unit is suited to fluidized solids systems, for use on bins where large plenum area reduces cleaning surge.

In two basic designs, the Bin Vent may be installed with filter bags projecting into customer's bin, or with its own filter housing for external mounting on bin. Three models in either design with 25, 42, or 63 sq. ft. of filter area are available. Operational air-to-cloth ratios are 5 to 15 cfm/sq. ft.

Typical applications include: at individual nuisance dust points in elevator systems where dust is to be returned to relieved area; on bin under pressure for venting air conveyors or air slides; for bin aeration; at fluidized conveyor truck unloading points to eliminate need for return line to truck.

Circle #74 on page 55.

Heating and Ventilating Catalog

A comprehensive engineering catalog for large heating and ventilating units and heat diffusers has been produced by Carrier Air Conditioning Company.

The 32-page catalog contains easy-to-read selection charts for steam and hot water coil capacities, fan-motor ratings and dimensional data for all models and sizes produced by Carrier.

The units, which are designed for commercial buildings, schools, churches, auditoriums and other large spaces, provide heating from 47,000 to 2,990,000 Btu with air capacities of 1,500 to 32,000 cfm.

Circle #75 on page 55.

New Low-Velocity ACT Units

Carnes Corporation's 12-page Catalog No. 1361 offers information on the company's new Low-Velocity Dual-duct Acoustic Terminal Control (ATC) Units.

Presented in this book are two ceiling models (in five sizes) with end discharge and bottom discharge—for which several diffusers (square or rectangular, round and modular) are available. Shown, too, are the two window perimeter models, featuring Carnes' linear, curtainaire or modular diffusers. Besides giving the facts on their units, Carnes has also supplied application diagrams, performance/sound rating tables for both Ceiling and Window/Perimeter Units, and specification data.

Circle #76 on page 55.

New Heater Sections

Heater sections for air-conditioning preheat, fresh air supply, and process and drying applications, with a unique face-and-bypass damper system for temperature control, are described in a new 12-page illustrated bulletin available from L. J. Wing Mfg. Co., Linden, N.J. Bulletin IFB-61 explains and pictures how thermostatically-controlled dampers regulate the proportion of air passing over heated coils or through bypass openings between coils, achieving temperature control without modulation of the heating medium, thus avoiding a source of freezeup problems.

Circle #77 on page 55.

New Dust Control Bulletin

A number of effective methods for controlling industrial dust and fumes are described in a new 20-page bulletin by Pangborn Corporation.

Bulletin 922A is prefaced with a short non-technical explanation of the advantages available through proper dust control, and lists the basic essentials comprising a typical dust control system.

Each Pangborn collector is described and illustrated with photographs and line drawings. Included are the new electric furnace exhaust hood and the "CO" cloth tube collector which is proving most effective for high-temperature, corrosive-gas applications.

Circle #78 on page 55.

Fallout Film

A new film called "Fallout," released by Cenco Educational Films gives insight into this problem of radioactive fallout and explains the dangers of radiation to human life and the possible results.

Circle #79 on page 55.

(Please turn to page 56)

Airborne-Particle Monitoring

A programmable instrument for the continuous, unattended size/concentration analysis of airborne particulates is described in a new leaflet issued by Royco Instruments, Inc.

Circle #84 on page 55.

1961 ASHRAE Guide And Data Book

The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) announces the distribution of its 1961 Guide And Data Book.

Circle #85 on page 55.

Air Pollution Publications

Technical Report A61-42 lists all of the current papers and reports on air pollution control available from The U.S. Department Of Health, Education and Welfare, Public Health Service, The Robert A. Taft Sanitary Engineering Center.

Circle #86 on page 55.

Vacuum Tweezer System

The Vacuum Tweezer Company announces a new bulletin on precision miniature parts handling system, using vacuum energy.

Circle #87 on page 55.

Air Valves, Blenders And High Capacity Acoustic Terminal Control (ATC) Units

Latest in their new series of catalogs is Carnes Corporation's Catalog 1161, covering their line of Air Valves, Blenders, and High Capacity Acoustic Terminal Control (ATC) Units, with information on their use in air distribution systems.

Circle #88 on page 55.

Cloth Dust Collector

An efficient cloth filter bag unit type dust collector designed to meet a wide variety of the air volume requirements throughout industry is described in Pangborn Bulletin 916.

Circle #89 on page 55.

Steam Coil Catalog

Catalog 305, offering complete information on Type "5" Steam Coils, has recently been issued by McQuay, Inc.

General design and engineering features for each of four Type "5" Steam Coils are included in this catalog. Some of the features listed are staggered tube design, copper tube headers, mechanical pressure bond and exclusive rippled-corrugated fins.

The catalog offers complete information on general and engineering specifications, coil selection, coil performance and piping data. Charts, tables and diagrams are available for selection, performance and piping.

Circle #90 on page 55.

Steam Heating Specialties

A complete line of Steam Heating Specialties is presented in a new Dunham-Bush catalog, Form 1501D. Included in the catalog are 56 illustrations and product drawings. Reference is made to the fact that the 1961 line of traps are refinements of the first commercially successful fluid-filled thermostatic radiator trap developed over 50 years ago by C. A. Dunham. Complete information is provided for capacities, dimensions and weights of Dunham-Bush radiator valves, inverted bucket traps, radiator traps, high pressure thermostatic traps, float and thermostatic traps, strainers and gauges.

Circle #91 on page 55.

Engineering Guides On Air Handling Problems

Four engineering reference guides are offered free by Chicago Blower Corporation, covering "Basic Fan Laws," "Velocities Required for Conveying Materials," "Air Velocities Required for Exhaust Hoods" and "Units of Measurement Required for Fan Selection."

Circle #92 on page 55

Unit Heater Catalog

A new downflow unit heater catalog 765-2 has been issued by McQuay, Inc.

Circle #93 on page 55.

Safety Guide

The latest in a series of safety guides, SG-9, on the disposal of hazardous wastes, is now available from the Manufacturing Chemists' Association, Inc. Gives procedures for disposal of flammable liquids, toxic and corrosive materials and other substances which may create an air or stream pollution problem.

Circle #94 on page 55.

Fan-Coil Controls Guide

A new 6-page guide covering electric controls for fan-coil units has been introduced by Minneapolis-Honeywell's Commercial division.

Circle #95 on page 55.

Evaporative Coolers

A comprehensive 4-page catalog gives detailed information on Young Evaporative Coolers for cooling jacket water, lube oil, compressed air and natural gas or for condensing steam and hydrocarbons.

Circle #96 on page 55.

PLAN
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For exhibit space, contact: Geo. E. Mills, Show Director, 1346 Connecticut Ave., N.W. Washington, D.C. • Phone COlumbia 5-0405

New PRODUCTS

To receive information on any of the New Products, circle the item reference number on the postage-free reply cards on page 55, Communications Center.

Cabinet-Type Dust Collectors

Purpose: Vacculator Co., Inc. offers a line of cabinet-type duct collectors for which a high efficiency is claimed.

Features: Three models, designated F.G.M. 5, 10, and 15 are powered with ½, 1, and 1½ hp. motors respectively, affording approximately 400, 600, and 900 cfm capacities. Each unit has two electrostatic filters placed in series. All models are mounted on rubber supports, are portable, completely fireproof, and are equipped with aluminum alloy impellers for spark-resistance. They also have exhaust silencers.

Circle #97 on page 55.

Air Conditioning Pre-heater

Purpose: For pre-heating or tempering fresh air supply.

Features: Steam or hot-water preheater section for air conditioning systems, designed by L. J. Wing Mfg. Co., offers close temperature control, virtually no stratification, and maximum protection against freezeup.

Has integral face-and-bypass damper system for temperature control. Steam pressure or hot water flow said to remain constant regardless of inlet air temperature variations, eliminating trapping problems and danger of freezeup.

Available in 11 sizes for installation in ducts from 3 sq. ft. to 49 sq. ft. in cross-sectional area, IFB sections may be installed singly or in multiple arrangements to fit any size duct. Minimum steam pressure is 5 psig; maximum is 200 psig with standard construction.

Circle #98 on page 55.

Electric Infrared Comfort Heaters

Purpose: Custom-type application for spot heating by Edwin L. Wiegand Co.

Features: Deep housing shells to contain and control heating in a tight radiation pattern. Available with metal sheath, quartz tube, or quartz lamp elements. In eleven models from 8 to 54 11/16 in.

Circle #99 on page 55.

Packaged Liquid Chillers

Purpose: Refrigerant-to-liquid use.

Features: New line of York chillers are direct expansion type, in 50, 60, 75, 100 and 125-ton sizes. Said to be compact, units are available with York "load-minder" to permit continuous, stable operation even at 10% of capacity loads. Shipped wired, piped and tested. Also available less condenser for remote water or air cooled condensing.

Circle #100 on page 55.

New "SQ" Airfoil Fan Line

Purpose: For varied industrial air handling applications.

Features: New aerodynamic design of wheel and housing inlet enables fan to operate more quietly at lower speed and with greater efficiency. Because less power is required, smaller motors can be used to reduce power consumption and save installation space.

Chicago Blower "SQ" Airfoil Fans, in sizes 8 to 18¼ in single and double inlets, are available up to 9" S.P.; in volumes up to 15,000 cfm; temperatures up to 200° F.

Circle #101 on page 55.

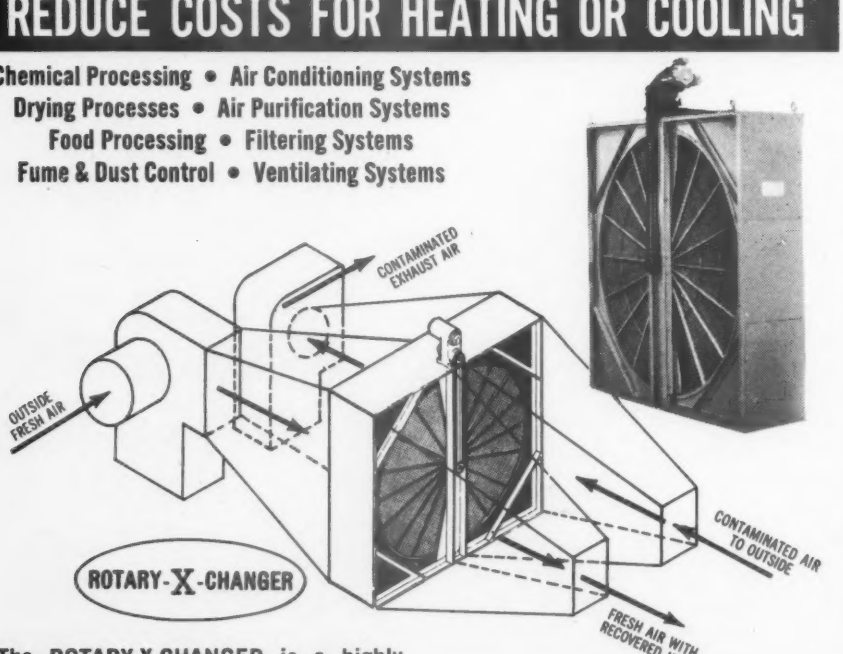
Remote Temperature Controllers

Two new remote temperature controllers for use in air or liquid media have been introduced by the commercial division of Minneapolis-Honeywell.

Both controllers operate by pressure on a remote liquid-filled sensing bulb which changes with

REDUCE COSTS FOR HEATING OR COOLING

Chemical Processing • Air Conditioning Systems
Drying Processes • Air Purification Systems
Food Processing • Filtering Systems
Fume & Dust Control • Ventilating Systems



The ROTARY-X-CHANGER is a highly efficient heat exchanger for recovering heat from contaminated air that must be exhausted and transferring this heat to a fresh air supply. Conversely, heat from fresh air can be transferred to exhaust air from air conditioned or refrigerated spaces, pre-cooling the incoming fresh air.

The ROTARY-X-CHANGER will recover more than 80% of wasted heat or reduce the fresh air sensible cooling load by more than 80% — WITH RESULTANT SAVINGS IN FUEL AND POWER.

Complete data including specifications and performance furnished on request.

HEAT RECOVERY CORPORATION 671 Mt. Prospect Ave., Newark 4, N. J. — Tel: HUmboldt 3-6468
Territories Available for Qualified Manufacturers Representatives

[For more information circle #35 on page 55 reply cards]

temperature to operate a snap-action switch.

Models are available with one or two switches. Single-switch models can be used for heating or cooling applications, to "make" or "break" on a rise in temperature.

Dual-switch models offer sequencing over a temperature differential. As the controlled temperature rises, for example, the first switch "makes."

If the temperature continues to rise, the other switch "makes."

With both models, three temperature ranges are available: from 0 to 100, 80 to 180 and 160 to 260 degrees F.

Circle #102 on page 55.

Acoustic Terminal Units

Purpose: A line of packaged low velocity dual duct acoustic terminal control units is announced by Carnes Corp.

Features: Unit includes pinpoint temperature control for specific rooms, blending of hot and cold air for discharge to individual space areas, attenuation of self-generated and duct-carried noises, manual volume adjustment, and pneumatic or electric temperature controls.

Carnes offers two ceiling models in five sizes and two window perimeter models in two sizes.

Circle #103 on page 55.

Heater Assembly

Reznor Manufacturing Company has introduced a new heater assembly which is said to make possible virtually limitless utilization of its direct-fired gas equipment in heating, heating and cooling, partial fresh and total make-up air, processing, and similar systems.

Designated the PAK Series, the unit consists of a factory assembly of from one to four Reznor DS Series duct furnaces together with complementary packaged blowers, mechanical flue exhauster, and control system to provide a complete packaged unit.

Four models are available, ranging in capacity from 200,000 Btu to 1,400,000 Btu input, and assembled in either push-through or pull-through arrangement.

Circle #104 on page 55.

(Please turn to following page)

Dust Control is a job for Engineers

The "rule of thumb" methods of the inexperienced, or the "engineering rules" of an experienced design, fabrication, and installation firm—which will you select for your dust control problems?

Kirk and Blum offers you...

ENGINEERING—a staff of qualified engineers with proven ability to solve your dust control problems.

RESEARCH—continuous research on full scale equipment, to develop the most efficient systems.

EXPERIENCE—over 50 years of dust control service

Every Kirk & Blum installation is based on a complete service: Design — Fabrication — Installation, backed by K & B's acceptance of One Undivided Responsibility for the system to assure your satisfaction.

On your dust control problem consult Kirk and Blum, craftsmen in dust control for the woodworking industry, where fine craftsmanship is appreciated. The Kirk & Blum Manufacturing Company, 3130 Forrer St., Cincinnati 9, Ohio.

KIRK & BLUM DUST CONTROL SYSTEMS

[For more information, circle #36 on page 55 reply cards]

New PRODUCTS

(Continued from preceding page)

Sound Analyzer Weighing Only 4 Lbs.

Purpose: From Industrial Acoustics Co., a lightweight, portable sound level meter and octave band analyzer meeting all pertinent ASA specifications.

Features: Octave band readings, over-all sound levels, or A, B and C scale readings are obtained by setting two switches. Direct readings are made from one indicating meter. A built-in battery check, electric calibrator and acoustical calibrator come as an integral part of the instrument.

Circle #105 on page 55.

Filter-Type Portable Transfer Unit

Purpose: For dense-stream pneumatic conveying of dusty materials.

Features: The latest of Fuller Co.'s portable Airveyor® units is available for 3″ and 4″ conveying lines.

Units handle a wide range of milled and pulverized materials, such as cracked grains, meals, feeds, flour, sugar, salt, salt cake, clay, soda ash, lime, polymers and many others.

Circle #106 on page 55.

Filter Mask

A new featherweight filter mask that combines high filtration and comfort has been made available by Minnesota Mining and Manufacturing Co.

The mask is designed for maximum filtration of non-toxic dust and sprays such as those encountered in woodworking, metal filing, sanding, spray painting and similar processes, down to .1 micron particle size.

Circle #107 on page 55.

Lint-Free Garments

Purpose: For white or superclean use to end contamination from clothing lint.

Features: Of Dacron/Nylon warp, new line of lint-free Tricot garments introduced by Worklon, Inc., are said to be lightweight yet opaque, with an added degree of comfort which permits garments to "breathe."

Said to resist soiling, ravelling if torn or snagged.

Circle #108 on page 55.

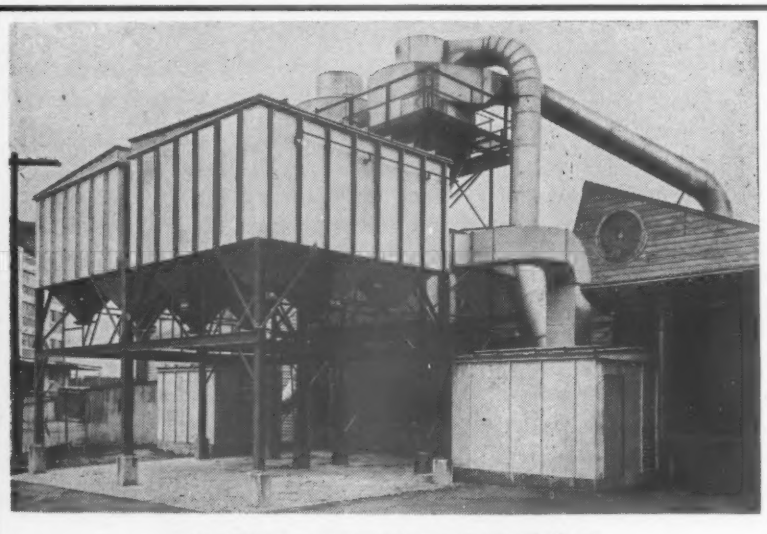
Microstat Clean Room Vacuum

A portable vacuum cleaner with high efficiency filter system meets the requirements for use in all classes of Clean Rooms. According to its manufacturer, The Kent Company, Inc. The Microstatic Impaction Filter used in the vacuum is said to be 100% effective in collecting dust, bacteria and other particles down to 0.3 micron particle size.

Circle #109 on page 55.

Fallout Shelter Filter

Barnebey-Cheney is now marketing a three-stage fallout filter unit suitable for protection from atmospheric contamination in the event of a nuclear attack. The fallout filter unit is designed to provide the greatest possible protection against large and small radioactive dust particles, chemical and biological agents, and poisonous gas caused by nuclear contamination. The high efficiency filter will remove radioactive dust particles as small as .3 micron. It also has the ability to remove



KLEISSLER

DUST SEPARATORS
DUST COLLECTING SYSTEMS

Kleissler dust separators feature ball bearing slide vibrating system for thorough cleaning, less resistance, longer life, and very little maintenance.

Engineers—Manufacturers of Dust Control Equipment since 1916

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G. A. KLEISSLER CO.
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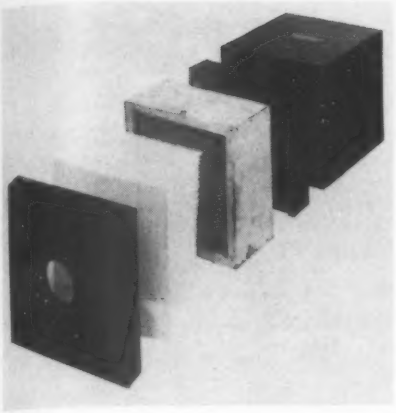
[For more information circle #37 on page 55 reply cards]



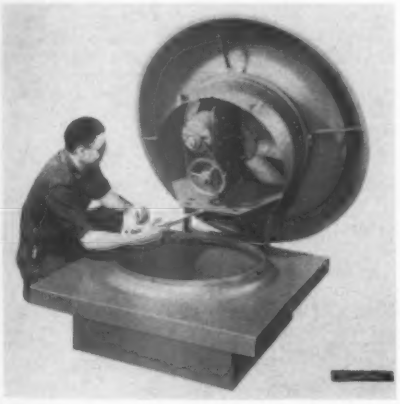
bacteria up to 99%. The activated charcoal filter will remove toxic gases.

Filter is designed to be placed either inside or outside the underground shelter. Frame is 12 5/16 in. (square) by 14 in.

Circle #110 on page 55.

Power Roof Ventilator

Motor and fan housing flips back 90° to make motor, drive assembly and fan easily accessible at a convenient working height above roof level. Access cuts maintenance costs substantially, according to the manufacturer. The



new DeBothezat Power-Flow roof ventilator is available with fan wheel from 12 in. to 48 in. in diameter and with capacities up to 43,070 cfm. Vertical Discharge Model exhausts dust and oil-laden air at high velocity, dispersing contaminants high enough to prevent re-entry into building's air supply.

Circle #111 on page 55.

Relative Humidity Indicator

A portable, compact, lightweight psychrometer designed for quick determination of the true relative humidity for general commercial and industrial use is announced by Cybernetics, Inc. Readings of wet and dry bulb can easily be taken in close proximity to critical manufacturing processes or in hard-to-get-at locations and storage places.

Circle #112 on page 55.

Packaged Industrial Space Heater

"Directaire" Heater is claimed to provide high efficiency heating or ventilating. Heated air discharges through "Directaire," adjustable pattern outlets or existing air conditioning ductwork—for constant, specified temperature levels. For heating and/or ventilating large areas in factories, warehouses, garages, auditoriums, offices, or stores.

Circle #113 on page 55.

New Beaver Boiler

Cleaver-Brooks Company, Milwaukee, the nation's largest producer of packaged boilers, has a complete new line of small, compact, gas-fired, hot water boilers.

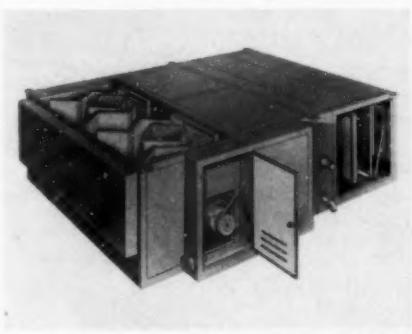
The new line consists of 16 sizes ranging in capacity from 200,000 to 3,000,000 Btuh.

Typical applications include small schools, motels, apartment buildings, restaurants, swimming pools, shopping centers and similar installations.

Circle #114 on page 55.

Auditorium Unit Ventilator

A new auditorium unit ventilator, the Herman Nelson AUDI-VENT, has been introduced by American Air Filter Co., Inc. Available for steam, hot water or



electric application, the AUDI-VENT has incorporated all of the important characteristics of the already successful Herman Nelson

(Please turn to page 63)

Steel Pickling Installation

KNIGHT Fume Washers

Knight Fume Washers are wet contact scrubbers. The working surface is BERL Saddle packing. This inert material provides maximum surface area with minimum pressure drop for efficient scrubbing.

Each unit is designed to provide low-cost operation, minimum fan power and water consumption. Each has a mist eliminator section through which the washed gas is discharged.

Knight Fume Washers are fully protected against corrosion by application of Pyroflex, Sealon or Neoprene lining to the full-welded steel shell. For hot gases an acid-proof brick lining is installed over the membrane. All internal parts such as the grillage, BERL Saddle packing and distributor are made of acid-proof material. Thus, the entire unit is inert to chemicals being handled. Typical fume removal installations:

HCl and organic vapors
H_2SO_4 pickling fumes
SO_2 and SO_3 gases
Chlorine gas
Smelter dust, fly ash
Plating tank exhaust
Nitric Oxides and HF

Write for Bulletin No. 90

Maurice A. Knight Co.
5 Kelly Ave., Akron 6, Ohio

KNIGHT-WARE
CHEMICAL EQUIPMENT

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POSITIONS AVAILABLE

MANUFACTURERS' AGENTS — We need many additional agents all over this country to sell a most successful wet dust collector, manufactured and sold in 12 countries beside the U.S.A. We have been in business for 15 years and have the product and the reputation on which to expand our business. Only qualified ventilating engineers need apply. Our agents have been notified of this advertisement. Please reply BOX AE-1265-8601, Air Engineering.

Use the Communications Center, page 55, to receive more information about any product advertised, any new literature or new product described. Circle the number on the postage-free card that refers to the item of your interest, add your name and address and mail.

To comment, criticize or make suggestions about any feature article in this issue, use the postage-free Editorial comment card.

New PRODUCTS

(Continued from page 61)

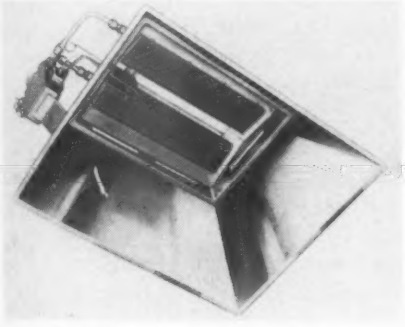
Classroom Unit Ventilators in sizes to suit applications in the more public areas of the school—auditorium, gymnasium, cafeteria, swimming pool, etc. It can be simply converted to either immediate or future year-round air conditioning.

Absorption surface is of a density so as to achieve a noise reduction coefficient of .70 - .80 in the range of 125 CPS to 4000 CPS.

Circle #115 on page 55.

Gas Radiant Heater

Dravo Corporation announces the Dravo Radiantflo heater, a gas-fired unit with a maximum output of 40,000 Btuh, for all applications where the characteristics of infrared heating offer the greatest advantages.

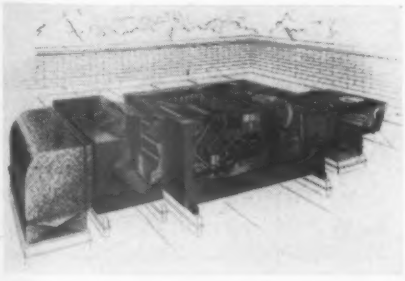


Circle #116 on page 55.

New Roof Top Units

A new line of Lennox roof-top units is now offered with a choice of gas-fired, oil-fired or combination fuel models. They are designed for the following types of applications:

Heating only, with or without



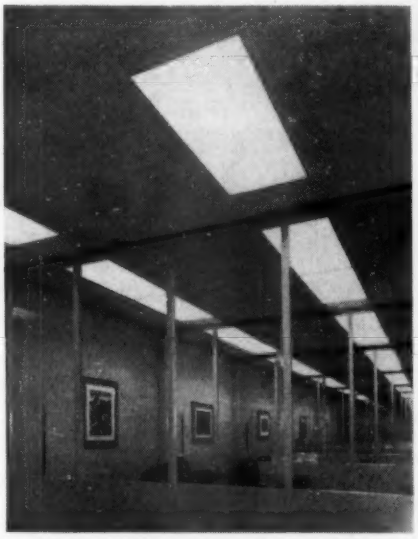
filters; heating and ventilating, with or without filters, and with manual or automatic dampers to proportion fresh and return air; heating-cooling-ventilating with manual or automatic dampers.

The heating output range of the new RT units is 280,000 Btuh to 1,000,000 Btuh with air volume range of 3000 to 15,000 cfm. Additive direct expansion evaporator units give 10 to 45 tons of cooling.

Circle #117 on page 55.

Ventilating Acoustical Ceiling

Improved air conditioning at lower cost has been made possible through a unique air-diffusion system developed by the Armstrong Cork Company. The system employs a new type of venti-



lating acoustical ceiling (shown above) that allows conditioned air to flow evenly into the room through thousands of tiny perforations in the ceiling material itself. The ceiling also doubles as an attractive, sound-absorbent interior finish. The system eliminates need for conventional diffusers and a substantial amount of ductwork, thus reducing construction costs.

Circle #118 on page 55.

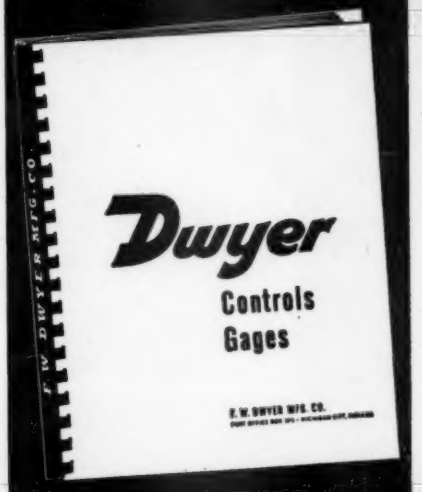
Heater-Air Conditioner

Welbilt Air Conditioning and Heating Corporation announces introduction of combination heating and cooling units. Designated as the WAGH Series these units are designed for roof top installation. Models range from 5 to 35 hp.

Circle #119 on page 55.

(Please turn to following page)

For the latest in Gages...Controls



NEW

Dwyer

INSTRUMENT MANUAL

Contains:

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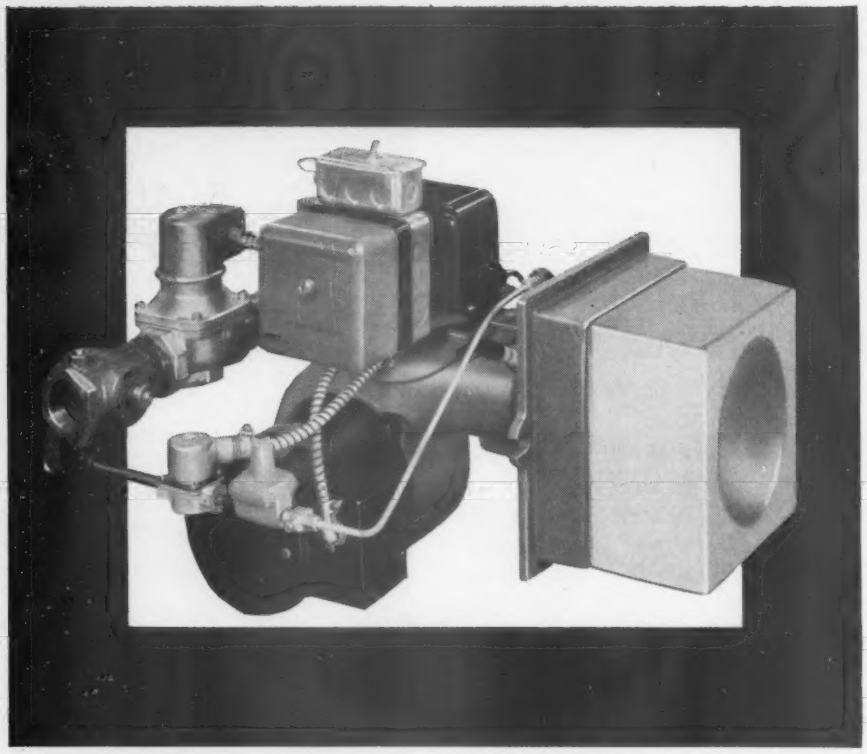
[Circle #39 on page 55]



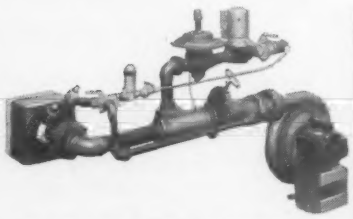
Ready-to-install incinerator burner assemblies "custom-made" to your requirements

From the broad range of Eclipse packaged incinerator burner assemblies — available as standard catalog items — you can select the exact "custom-made" burner that will solve your incineration smoke and odor problems on any job and assure complete satisfaction.

All models are factory-assembled, tested, and shipped complete, including combustion block, ready for installation.

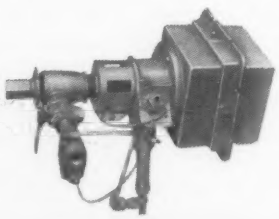
Model 800 SIB, shown above, has a capacity range from 100,000 - 900,000 Btu/hr. Package includes pilotstat or electronic flame safety protection, spark ignition, and blower for combustion air. Available in five different assemblies for a variety of needs.

Bulletin H-51-C describes this burner assembly in detail. Write for your copy today.



BLAST TORCH BURNERS

Three sizes — 400,000 to 1,200,000 Btu/hr. Produce hard flame, higher temperatures, more capacity for tough incineration jobs. Write for Bulletin H-50.



ATMOSPHERIC BURNERS

Six sizes — 50,000 to 500,000 Btu/hr. Operates on nominal draft — no blower or electricity — for incineration of readily combustible materials. Write for Bulletin H-52.

Eclipse®

COMBUSTION DIVISION
ECLIPSE FUEL ENGINEERING COMPANY
1120 Buchanan Street, Rockford, Illinois

[For more information circle #40 on page 55 reply cards]

New PRODUCTS

(Continued from preceding page)

Temperature-Velocity Direct Reading Meter

Direct accurate reading of air velocity and air and surface temperature is possible with the new Flowtronic 55 introduced by Flow Corporation. Temperature measurement range is 20°F to 220°F and air velocity ranges are 0-1000

fpm, 1000-2000 fpm, and 2000-4000 fpm.

A rapid response electrical output (d.c. to 1000 cps) suitable for use with a chart recorder is an additional standard feature. The temperature scale is linear over the entire 20°F to 220°F range while the velocity scale is linear at high velocities.

Circle #120 on page 55.

Heavy Duty Flexible Duct

A new extra-heavy duty Type 8R-L flexible duct for bulk handling abrasive materials and exhausting corrosive fumes and gases has been announced by The Wiremold Company. It is designed for gravity feed under positive pressures. Has excellent resistance to most inorganic salts, alkalis, and acids, including such highly corrosive chemicals as hydrochloric and hydrofluosilicic acid.

Circle #121 on page 55.

To receive information on any of the New Products, circle the item reference number on the postage-free reply cards on page 55, Communications Center.

ELP THREE INDUSTRIES KEEP THE

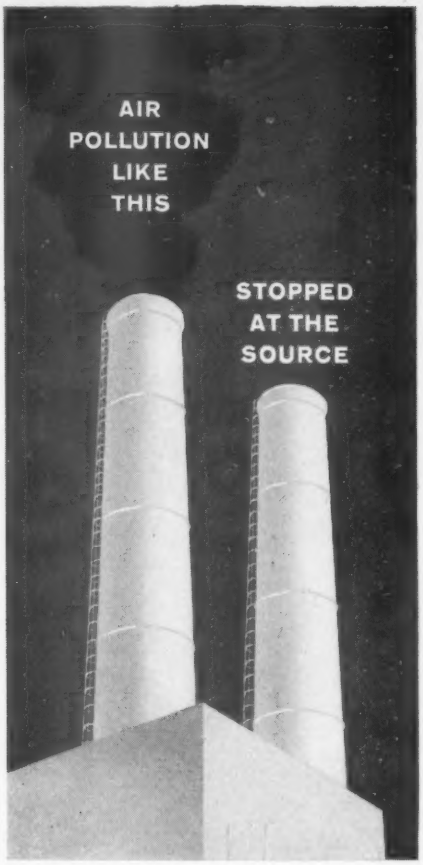
Air is "white sheet" clean at Ideal's Tijeras plant. Over 5 acres of Fiberglas filter fabrics were used.

2. IDEAL CEMENT COMPANY, TIJERAS, NEW MEXICO. With Fiberglas filter bags, Ideal Cement is filtering out air pollutants without the need for a smoke stack. The operation is so immaculate that a housing development has been built nearby. This plant was named one of the top ten in 1960 by Factory Magazine.

HE AIR CLEAN

"Fiberglas bags have served 24 hours a day . . . over 1,000 days . . . in a corrosive 420 deg. F. atmosphere . . . are still going strong." D. C. Paulsen, Manager, Franklin, La., plant.

3. CABOT CORPORATION, U.S.A., CANADA, SOUTH AMERICA, EUROPE, AUSTRALIA. This carbon black manufacturer has standardized on Fiberglas filter bags in all nine plants. Corrosion problems are reduced. Bag replacement is infrequent because of the exceptional thermal endurance of Fiberglas fabrics and their resistance to moisture and chemicals.



UP TO 500° F—AND ABOVE—

FIBERGLAS FABRIC FILTERS THE AIR WITH 99.9% EFFICIENCY

Many solutions to the air pollution problem have been tried. None, however, has achieved such effective results at so low a cost as the method which uses a battery of Fiberglas fabric filter bags.

The important difference is: the silicone-treated Fiberglas* fabric withstands temperatures up to—and even above 500° F. This is twice the limit of other fabrics. It is therefore possible to apply the filter closer to the source of pollution. This reduces the need for pre-cooling systems.

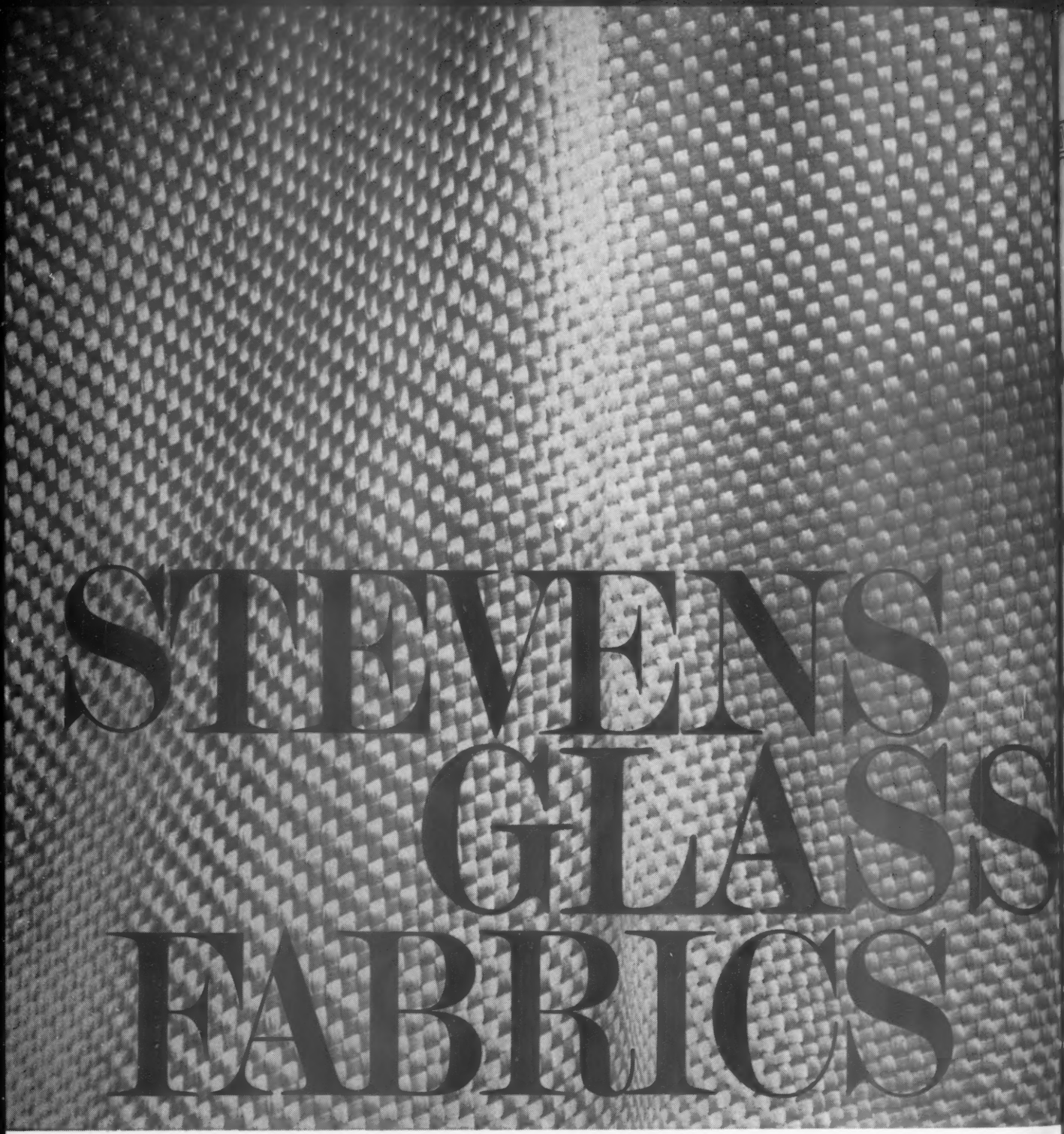
CLEANING AIR IS OUR BUSINESS. The superior qualities of the new filtration fabric made from Owens-Corning Fiberglas yarns are the result of many years experience with filtration problems. On the accompanying pages are case histories of prominent manufacturers who selected Fiberglas fabric filters. For further information, write for our free guide book: "Fiberglas Fabric Filters for High Temperature Dust and Fume Control." It is based on our presentation at the 1961 APCA Annual Meeting. Owens-Corning Fiberglas Corporation, Industrial Textile Division, 717 Fifth Avenue, New York 22, N. Y.

Makes the glass yarns, not the fabrics

OWENS-CORNING

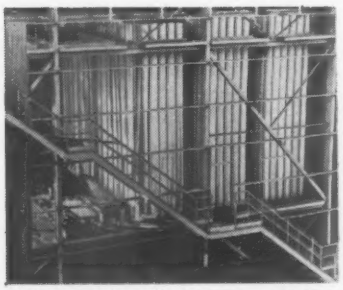
FIBERGLAS

*T-M. (Reg. U.S. Pat. Off.) O-C.F. Corp.

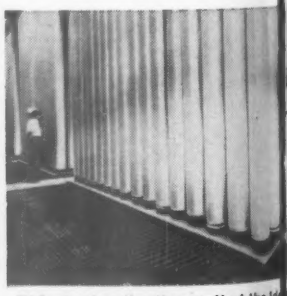


500°F FILTRATION

- ...filter bags made with STEVENS glass fabric with SLKN™ finish operate efficiently at temperatures above 500°
- ...eliminate the need for costly cooling equipment
- ...will not shrink or stretch
- ...have high collection efficiencies
- ...are unaffected by most corrosive fumes
- ...afford easy cake release due to the extra smooth water repellent SLKN™ surface
- ...STEVENS Fiber Glass Filter Fabric Clinic is available for research and development on a confidential basis
- ...names of fabricators of filter bags made with STEVENS SLKN™ glass fabric will be supplied upon request



Stevens' glass filter bags are gaining widespread acceptance as media to clean industrial plants' gas and smoke exhaust and thus reduce air pollution and smog.



This dust collection unit at the Ideal Cement Co. has 1280 glass fabric filter bags which catch about tons of dust a day.

FINE FABRICS MADE IN AMERICA SINCE 181

J. P. STEVENS & CO., INC. INDUSTRIAL GLASS FABRICS DEPARTMENT
Stevens Building, Broadway at 41st St., N. Y. 36, N. Y. OXford 5-1

[For more information circle #12 on page 55 reply cards]

NEXT MONTH

AIR | ENGINEERING

BRINGS YOU THESE FEATURED ARTICLES

DUST COLLECTOR SCREENS DUST FROM STONE, SAVES $13,000 OVER SEPARATE SYSTEM

(by Fred T. Pike, president, Empire Blower Co., Rochester, N. Y. Dust collection system in a black top plant fulfills dual purpose of removing dust from stone crushers and segregating stone into one bin, dust into another. Same system also conveys crushed stone and produces cleaned stone.)

PNEUMATIC CONVEYING SPEEDS PRODUCTION OF CEMENT BLOCK AND ASPHALT

(by C. H. Booth, Jr., vice president, Burrell Construction & Supply Co. Techniques of moving fine particles through duct (material handling systems) are much the same for moving dust laden air to collector. Pneumatic conveying is fast, sanitary (for foods) and economical (saves product). Article tells how an integrated cement and asphalt plant uses pneumatic conveying.)

VENTILATION FOR BAG PACKING OF CHEMICALS

(by Wm. V. Andresen, chief industrial hygienist, American Cyanamid Co. Hood and duct design for keeping toxic solids out of plant air when filling open top paper bags or any container on a production basis.)

FLEXIBLE COOLING FOR A FLEXIBLE OFFICE BUILDING

(by Norman Kurtz, Fred S. Dubin Co., consulting engineers. Because interior partitions can be moved and storage spaces converted to office spaces, the air conditioning system must be able to cope with non-predictable population densities and equipment loads.)

Plus Many Other Articles & Reports Dealing Directly With Air Quality Control . . . For Comfort, Process, and Profit. You'll want to keep abreast and informed of all events and technical developments in this industry . . . so fill out and mail this order blank to start your subscription.

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National Exposition

Air Devices Inc.
Pull Down Filters (30)

Air Moving & Conditioning Association, Inc.
Directory (18)

Adjusto Equipment Co.
Chairs for White Rooms (31)

Automotive Rubber Co., Inc., Process Equipment Div.
Wet Collector (17)

Buell Engineering Co., Inc.
Dust Control Equipment (13)

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Make-Up Air Burner (27)

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Ultra-Filtration Unit (21)

EDITOR: DECEMBER, 1961

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New Literature

(Continued from page 54)

Direct Contact Gas Heating

Literature on a new development, the engineered application of electric heat to the direct contact heating of gases up to 1800°F, is now available from Hynes Electric Heating Company.

Circle #77 on page 55.

Small Unit Heaters

A new 20-page catalog has been prepared by Carrier Air Conditioning Company containing specification data on three types of small-capacity steam and hot water unit heaters manufactured by the company.

Circle #78 on page 55.

Gas Infrared Process Applications

An eight page, bulletin on application of gas infrared equipment for pre-heating, moisture removal, paint baking and curing applications in industrial processes is available from Fannon Products Division, Hupp Corporation.

Bulletin describes the Fannon-Schwank infrared heater and discusses the theory and application of infrared energy. In the application section the bulletin shows 18 oven installations for a variety of process applications and describes the results achieved.

Circle #79 on page 55.

Make-Up Air Heating

Comprehensive data on direct-fired make-up air heating is given in new 8-page Bulletin AS-62 published by Maxon Premix Burner Company.

Circle #80 on page 55.

Gas Fired Unit Heaters

Bulletin A-817 describes the new line of American-Standard Series NF propeller fan type gas-fired unit heaters.

Circle #81 on page 55.

Building Insulation

A new 20-page catalog on "Foamglas Building Insulation," has been published by the Pittsburgh Corning Corporation.

Circle #82 on page 55.

Directory Of Super-Clean Room Equipment

Over 200 manufacturers of all types of supplies and equipment for industrial super-clean or white rooms are listed in a Directory published in the November issue of AIR ENGINEERING and now available (in limited quantity) as a separate reference.

Circle #83 on page 55.

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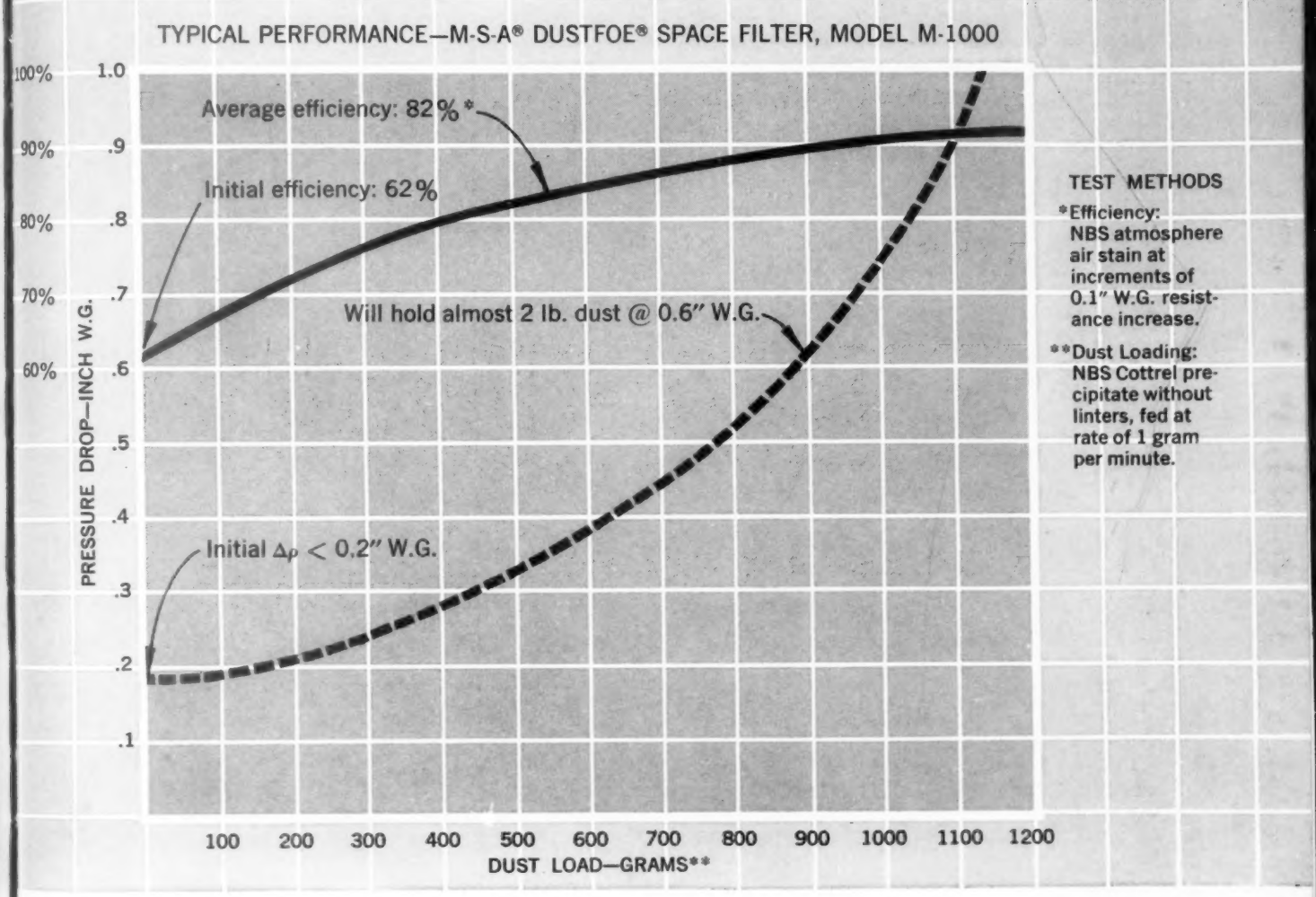
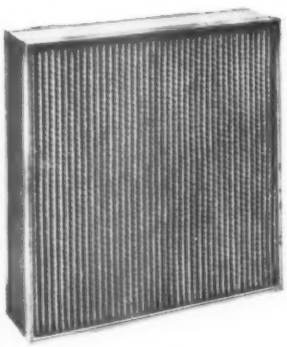
New M-S-A® Dustfoe® Space Filter

lasts six months longer, holds 3 times more dust than previous model





The M-S-A Dustfoe Space Filter is available in either 1000 SCFM models or 2000 SCFM models. Other Dustfoes of higher efficiencies are also available.

Any filter will increase its efficiency with use because of the dust build-up. So how do you get the drop on a really meaningful interpretation of air ventilation filter efficiency? Answer: determine *initial* efficiency.

MSA does. The percentage figures appear in the graph above. And because we have documented our initial efficiency rating, our average percentage figure is just that much more impressive when compared with other filters.

A true high-efficiency filter

A new specially compounded and textured filter medium provides unusually low resistance to air flow. And by presenting an irregular or "fuzzy" surface, this filter permits high initial efficiency, with greater retention of dust in one-half the volume occupied by filters using deep bed media.

UL Approval

On the basis of Flame Exposure tests conducted by Underwriters' Laboratories, these filters will be listed as Class I units.

For a detailed presentation of supporting data on the new M-S-A Dustfoe Space Filter, please write for MSA Technical Products Release-1507. Mine Safety Appliances Company, Pittsburgh 8, Pa.

MINE SAFETY APPLIANCES COMPANY
Fluid Purification Specialists

MSA

[For more information circle #41 on page 55 reply cards]

'BUFFALO' FG FANS

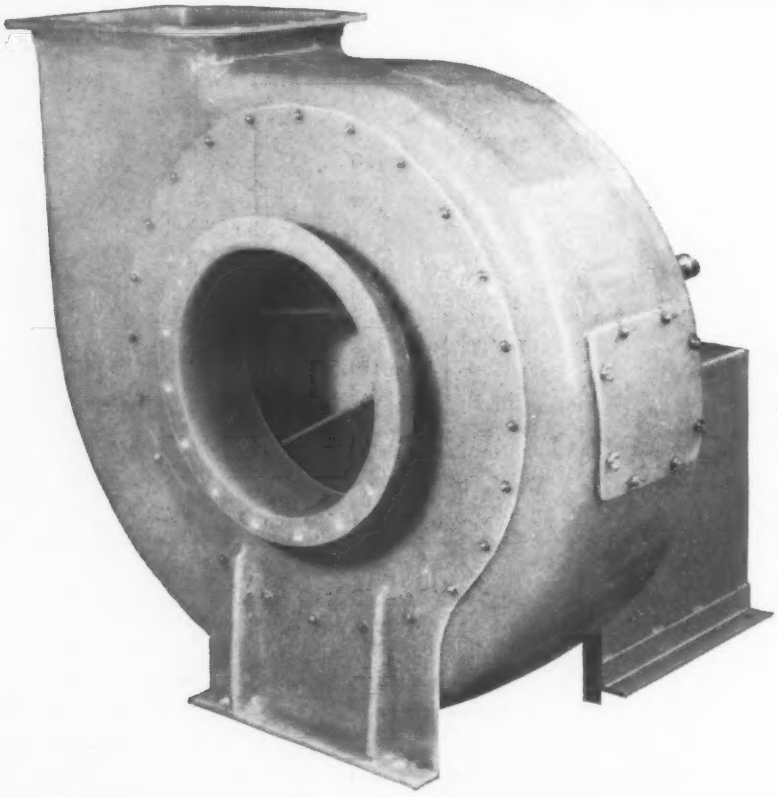
It takes more than an ordinary fan to exhaust many of the highly corrosive fumes encountered today... to do the job at a reasonable cost... and to resist chemical attacks.

'Buffalo' fans, with resin bonded fiber glass housings... fiber glass protected wheels and shafts, are that kind of fan.

Designed for temperatures to 225° F and higher, thermosetting plastics used on 'Buffalo' Type FG fans will not support combustion. They have high impact strength, excellent resistance to a wide range of acids, salts, gases, organic materials and other corrosives. The fans are statically and dynamically balanced to assure vibrationless performance.

A wide selection is available in capacities to 34,000 cfm and pressures up to 10" static. The Buffalo representative in your area can quickly provide helpful information related to your individual requirements. You can save time and money by consulting him.

...Fiber Glass Protection Against Corrosive Fumes



"Buffalo"

AIR HANDLING DIVISION

BUFFALO FORGE COMPANY

Buffalo, New York

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

'Buffalo' Air Handling Equipment to move, heat, cool, dehumidify and clean air and other gases.

'Buffalo' Machine Tools to drill, punch, shear, bend, slit, notch and cope for production or plant maintenance.

'Buffalo' Centrifugal Pumps to handle most liquids and slurries under a variety of conditions.

Squier Machinery to process sugar cane, coffee and rice. Special processing machinery for chemicals.

[For more information circle #42 on page 55 reply cards]

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